

QA-85-5959-1

9 SEPT. 1985

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GEOCHEMICAL EVALUATION OF THE STATOIL 6506/12-3 WELL

HALTENBANKEN, OFFSHORE NORWAY

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SUMMARY

The section between 950 metres and 4360 metres (TD) has been evaluated.

With few exceptions the predominant mudstones and shales above 3708 metres have a poor potential for gas and are immature. Minor fair and good mudstones are present at 1900-1950± metres.

Rich shaly mudstones in the Nesna Formation (3708-3720 metres) are generating significant volumes of hydrocarbons and, per unit volume, have an excellent potential for gas-condensate and associated light-medium gravity crude oil.

The Engelvaer is characterised by poor to fair, effectively marginally mature shales. Beds of shale mudstones and siltstone within the Tomma, Leka and Aldra formations (below 3818 metres) are commonly fair, with good intervals, source rocks for gas-condensate and traces of crude oil. On structure, they lack the necessary thickness, and maturity, to be effective source rocks.

Peak generation, from oil prone organic matter, is believed to commence at 4100± metres but due to the nature of the organic matter the analysed sediments do not achieve this level of maturity.

Shows of migrated hydrocarbons with the Nesna formations and in the Middle and Lower Jurassic sands are discussed in detail in the Conclusions.



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INTRODUCTION

This report presents a geochemical evaluation of the section between 950 metres and 4360 metres in the 6506/12-3 well, drilled by Statoil, offshore Norway.

The study was designed to evaluate the hydrocarbon potential of the section in terms of richness, maturity and potential for oil or gas; with further analyses to detect and characterise shows of migrated hydrocarbons.

This project was authorised by T. Mayer, Statoil, Stavanger.

A. ANALYTICAL

A total of two hundred and fifty four (254) canned ditch cuttings samples, thirty eight (38) sidewall core and fourteen (14) core samples were received, and assigned to Geochem job number 1106.

Contamination (grease) was observed whilst washing the samples from the 3910-4060 metre interval. Lignite believed to be drilling introduced is also present at 2950-3530± metres.

The samples were analysed under contract T6192 No. 10 (telexes 28.5.85, 6.6.85 and 20.6.85). A total of one hundred and twenty six light hydrocarbons analyses, two hundred and ninety nine organic carbon determinations, one hundred and forty one Rockeval pyrolysis analyses, fifty one visual kerogen analyses, fifty nine vitrinite reflectance determinations, thirty two extractions with chromatography, thirty two C₁₅₊ saturates analyses, thirty two C₁₅₊ aromatics analyses, twenty three pyrolysis-GC analyses, thirty eight carbon isotope determinations (on saturates aromatics and total extracts) and twenty two 8 ion mass fragmentograms were performed in this study.

The data are listed in tables 1 to 14 and presented graphically in figures 1 to 17.

B. GENERAL INFORMATION

Ten (10) copies of this report, and the kerogen slides prepared for this study, have been forwarded to T. Meyer, Statoil, Stavanger. A copy of the data has

been retained by Geochem for future consultation with authorised Statoil personnel.

The results of this study are proprietary to Statoil.

RESULTS AND DISCUSSION

Each of the relevant parameters are first considered separately, and then collectively in the "Conclusions".

Well logs were not available for this study but a summary of the lithological formation tops was supplied by the client.

A. ZONATION

This zonation is based upon a consideration of the formation tops and of variations in the geochemical parameters. A total of eight (8) zones are recognised.

Zone A (950-2278 metres) is composed of interbedded sands and light olive grey silty mudstones which pass, below 1900± metres, to a sequence of very light brownish grey shaly mudstones and light olive grey shales.

The C_1 - C_4 hydrocarbon gases improve from 2141 ppm-6327 ppm to 13822 ppm in the deepest sample. Gas wetness values are less than 8.2% and isobutane to normal butane ratios of up to 5.20 confirm that the sediments are immature. Traces (less than 777 ppm) of the C_5 - C_7 hydrocarbons were detected in this interval.

Zone B¹ (2278-2500± metres) includes the sediments from the Bodoé Formation (above 2332 metres) and Flatoey Group. They are dominantly very light brownish grey and olive grey mudstones in the Bodoé but medium grey to medium light grey shales and shaly mudstones predominate in the top of the Flatoey.

Gaseous hydrocarbons are relatively poor (1607-4356 ppm) and dry, containing less than 23.6% C_{2+} hydrocarbons. The butane ratios 0.36-0.75 are significantly lower than those in Zone A. Gasoline range hydrocarbons are very sparse at 147-990 ppm.

Zone B² (2500-3146 metres) corresponds to the lower part of the Flatoey Group. This interval is dominated by medium grey mudstones and shaly mudstones; with silty interbeds above 2700± metres.

The gases, in general, are somewhat richer (325-9096 ppm) than those in Zone B¹ but, more significantly, are much wetter (35.5-86.3% C₂₊ hydrocarbons). The ratios of isobutane to normal butane are low (less than 0.57). C₅-C₇ hydrocarbons range from 645 ppm up to 9271 ppm and reach 12897-16771 ppm in the top 50± metres of this zone. Shows of migrated hydrocarbons are suspected.

Zone C (3146-3708 metres) largely consists of interbedded medium grey mudstones and shales; from the Finnvaer Group. Beds of brownish grey silty mudstone occur below 3600± metres and limestones are present in the basal 10± metres.

The gases and gasolines, at 573-4723 ppm and 576-5937 ppm, are somewhat leaner than those in Zone B². These gases have similar butane ratios (0.15-0.68) but are, on average slightly drier (30.3-81.3% wetness) than those in the overlying zone.

Zone D (3708-3822 metres) includes the Nesna and, at 3720-3822 metres, the Engelvaer formations. Sidewall cores from the Nesna are, apart from the medium light grey mudstone at 3708 metres, dark grey to medium dark grey shales and shaly mudstones. This interval is also represented by a ditch cuttings sample, containing medium dark grey shales and olive grey mudstones. The Engelvaer from the ditch cuttings appears to be a sequence of medium dark grey shales and silty mudstones but the sidewall cores from this interval suggest that the mudstones are shaly. Changes in apparent lithology are believed to be due to turbodrilling although there is little evidence of this from the morphology of the cuttings. There is, however, a high proportion of caved material in these samples.

Hydrocarbon gases in the Nesna are fairly rich (10360 ppm) and wet (70.9%), have low (0.25) butane ratios and good abundances (12308 ppm) of the associated C₅-C₇ hydrocarbons. Within the Engelvaer the C₁-C₄ hydrocarbons improve from 3680-8200 ppm to 12445-14486 ppm below 3800± metres. They are generally wet, containing 48.8-79.2% C₂₊ hydrocarbons, and have low (less than 0.22) butane ratios. The gasoline fraction (1687-7411 ppm) is

relatively sparse.

Zone E¹ (3822-4013 metres) corresponds to the Tomma Formation; which comprises the Upper Sandstone, Siltstone (at 3908-3947 metres) and Lower Sandstone members. Although sample quality is poor (abundant LCM) it would appear that the dominant sandstones are interbedded with medium dark grey shales and siltstones, brownish grey silty shales and 3890-3930± metres thin evaporites. Minor coal is also present in the samples below 3940± metres.

Gas abundances drop from 19926-19940 ppm above 3840± metres to 1513-4578 ppm (11935 ppm at 3880± metres) in the Upper Sandstone and Siltstone members. The Lower Sands are somewhat richer 4060-30488 ppm, due possibly to the coals in this interval. Gas wetness values vary erratically between 30.2% and 87.5% in this zone whilst the butane ratios are less than 0.4. The heavier C₅-C₇ hydrocarbons are abundant (29740 ppm) in the top sample but are leaner (573, 161207252 ppm) elsewhere.

Zone E², lying between 4013 metres and 4146 metres, is equivalent to the Leka Formation. Sandstones predominate above 4070± metres. They overlie an interval of silty shales (N4) and mudstones (brownish grey) which pass, below 4090± metres to interbedded sandstones, medium dark grey siltstones and silty shales.

Kicks of 10324 and 19643 ppm were detected at 4020-4030± metres and at 4050-4060± metres but the C₁-C₄ gases are generally less than 7543 ppm. They are nonetheless wet to very wet (43.6-92.0%) and have low (less than 0.34) butane ratios. C₅-C₇ hydrocarbons peak at 11360-12461 ppm (at 4060± metres and at 4110-4130± metres) although lower abundances (795-5805 ppm) are prevalent.

Zone F, 4147 metres down to total depth at 4360 metres, includes the Aldra, above 4302 metres, and Hitra formations. Sandstones are interbedded with minor to significant medium dark grey silty shales in the Aldra and with medium dark grey shales in the Hitra.

The light hydrocarbons are abundant at 4150-4160± metres and at 4170-4180± metres (11812-33009 ppm and 10522-20452 ppm for the C₁-C₄ and C₅-C₇ fractions respectively). They are somewhat leaner (generally less than 10000 ppm) but intermittently reach values of 10604-18026 ppm below 4240± metres. Gas wetness values are variable (37.2-80.8%) but commonly exceed 50% whilst the butane ratios are less than 0.37.

B. AMOUNT AND TYPE OF ORGANIC MATTER

The amount of organic matter within a sediment is measured by its organic carbon content. Average shales contain approximately one 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 Zone A mudstones mainly have below average (0.15-0.87%) organic carbon contents but improve to 1.00-2.68% at 1850-2210± metres. Their organic matter largely consists of land plant derived woody, inertinitic and herbaceous debris with better quality woody, amorphous and algal kerogen in the mudstones at 1900-2200± metres.

Light grey mudstones from the Flatoey Group (Zone B¹) are lean (less than 0.30% organic carbon) whilst the beds of olive grey and medium grey mudstone and shale are marginally richer at 0.67-0.97%. Similar values (0.70-1.04%) apply to the Zone B² mudstones where a slight improvement is apparent below 2900± metres. Despite these variations the organic matter is dominantly woody and inertinitic in character, with minor, occasionally significant amounts of herbaceous and algal material.

The medium grey mudstones and shales of Zone C (Finnvaer Group) have "average" organic carbon contents (0.73, 0.81-1.34%) although the minor greyish red mudstones and the limestones below 3630± metres are very lean (less than 0.30% organic carbon). Wood and inertinite, with traces of herbaceous and algal kerogen is present in the medium grey mudstones and shales. Within the Finnvaer the turbodrilled interval (below 2880 metres) is associated with abundant drilling introduced lignite. The woody fraction of the kerogen in the cuttings samples, when compared to the sidewall core samples, is clearly enhanced by this material.

At the top of the Nesna (3708-3720 metres) the medium dark grey shales resemble those in Zone C. The underlying shaly mudstones, however are

richer 7.08-8.46% organic carbon and contain good quality organic matter. This changes from mainly amorphous to a mixture of algal, amorphous, inertinite and woody debris within the 3712-3718± metres interval. The Engelvaer shales/mudstones are not only leaner (0.80-2.46% organic carbon) than those in the Nesna but their organic matter reverts to the dominantly woody and inertinitic type.

Beds of dark grey to medium dark grey shale (silty) in the Tomma sands have above average (0.94-3.06% organic carbon) contents of woody, with significant inertinitic and herbaceous, organic matter. The thin coals at 3940-3980± metres are rich (65.9-67.0% organic carbon).

Within the Leka Formation (Zone E²) the medium dark grey and brownish grey shales, silts and silty mudstones commonly have above average (0.80-2.53%) organic carbon contents. Down to 4070± metres the organic matter resembles that in the Tomma shales but below this depth the sediments contain a mixed woody, herbaceous, inertinitic and algal organic assemblage.

Below 4147 metres the shales (silty) of the Aldra and Hitra formations commonly have above average (0.74-2.45%) organic carbon. Their land plant derived organic matter resembles that in the Tomma and upper part of the Leka formations.

C. LEVEL OF THERMAL MATURATION

Visual kerogen (spore colour) and vitrinite reflectance techniques have been used to assess thermal maturity.

An inspection of the thermal maturation indices indicates that a value of 2- is achieved at $2800\pm$ metres, 2 at $3720\pm$ metres and 2 to 2+ at $4200\pm$ metres, probably as high as $4100\pm$ metres.

When plotted against depth, the vitrinite reflectance data for both cuttings and core samples fall into two groups. The more mature population (generally greater than 0.9% Ro) is, thus, clearly due to reworked woody organic matter; which visually appears to be common in these sediments. The less mature populations suggests a trend which increases steadily down to $2000\pm$ metres. There is, apparently, a near vertical trend in the Flatoey and Finnvaer Group sediments, which is anomalously mature at the top of the interval. This effect is believed to be due to low maturity reworked organic matter. The preferred trend reaches 0.45% Ro at $2800\pm$ metres and 0.53% Ro in the Nesna Formation at $3708-3720\pm$ metres. This trend if extended reaches 0.72%, top of the "oil window", at approximately $5500\pm$ metres - which is unusually deep.

Maturation indices of 2-, 2 and 2 to 2+ normally correlate with vitrinite reflectance values of 0.45%, 0.53% and 0.72% Ro. There is, thus, a good agreement between the two methods down to $3730\pm$ metres, below which depth they diverge appreciably. The visual kerogen data from the core and sidewall core samples definitely establish the top of the oil window (2 to 2+, 0.72% Ro) at $4210\pm$ metres and probably as high as $4100\pm$ metres. These results are believed to be more reliable and will be adopted in this study.

Amorphous, herbaceous and algal kerogen is marginally mature at 2- and starts to generate minor volumes of hydrocarbons. Significant hydrocarbon generation commences at 2 and the top of the oil window occurs at 2 to 2+. The corresponding values for woody organic matter are 2, 2 to 2+ and 2+. From the foregoing it is evident that the prevailing woody and inertinitic organic matter, down to $3700\pm$ metres is immature or effectively so. The Nesna shales are at the threshold of significant hydrocarbon generation whereas the shales and silts in the Tomma, and down to $4100\pm$ metres in the Leka are, effectively, marginally mature (minor hydrocarbon generation). Herbaceous kerogen in the Leka silts, below $4100\pm$ metres, and those in the Aldra, is at oil window

maturity. The effective maturity of these sediments is dictated by the state of the more abundance woody and inertinitic debris. They are, therefore, effectively mature (significant hydrocarbon generation).

D. SOURCE RICHNESS

Within Zones A and B¹ the abundance of light hydrocarbons indicates that the mudstones and shales are generally fair source rocks. This parameter cannot be used in the underlying sections since the gas wetness values indicate enhancement of the indigenous hydrocarbons by out of place migrated species.

Organic carbon contents afford a preliminary assessment of potential source richness. Within Zone A the mudstones are fair with good interbeds whilst Zones B¹ and B² (Flatoey Group) are generally fair. The dominant mudstones and shales in Zone C (Finnvaer Group) are also fair with good interbeds. The Nesna (at 3708-3720 metres) is dominated by very good to rich shales/shaly mudstones whilst the Engelvaer shales and mudstones are rated as good source rocks. Beds of shale and siltstone/silty shale within the Tomma and Leka sands are generally good but the minor coals at 3940-3970± metres are rich. Good values also apply to the silty shales within the Aldra Formation.

The abundance of indigenous C₁₅₊ hydrocarbons is related to source richness. Down to the top of the Nesna at 3708 metres the mudstones and shales yielded less than 224 ppm C₁₅₊ hydrocarbons - suggesting poor to fair source rocks. The paraffin-naphthene fraction chromatograms, however reveal, in addition to immature indigenous species, traces of drilling introduced contamination and of crude oil (see Section E). A poor rating for this interval would therefore appear to be more appropriate. Up to 6697 ppm C₁₅₊ hydrocarbons were extracted from the underlying sediments but high hydrocarbon to total extract ratios, and the saturates chromatograms, indicate enhancement by contamination and crude oil (see Section E). Their abundance is thus unrelated to source richness.

Pyrolysate yields are relatively unaffected by contamination. Yields of less than 1.14 mg/g pyrolysate in all but the mudstones at 1900-1950± metres confirm that the mudstones and shales from the Alstahaugh-Finnvaer formations are uniformly poor source rocks. At 1900-1950± metres yields of 2.37-3.33 mg/g indicate that these mudstones are fair and good source rocks. Medium dark grey shaly mudstones within the Nesna Formation are rich (18.4-22.5 mg/g pyrolysate) whereas the Engelvaer shales are poor (less than 1.45 mg/g pyrolysate) with scattered fair and good interbeds yielding 2.08-4.64 mg/g pyrolysate. Pyrolysate yields of up to 3.59 mg/g indicate that the interbeds of shale and silt in the Tomma are fair with good interbeds improving to very good

(7.75 mg/g) at 3950± metres. Interbeds of siltstone, silty shale and mudstone in the Leka Formation are generally fair source rocks with good intervals (up to 4.01 mg/g pyrolysate). Minor silty shales in the Aldra Formation (yielding up to 3.06 mg/g pyrolysate) are similarly rated but the Hitra shales are poor; possibly good at 4320± metres.

The nature (gas, condensate or oil) of potential hydrocarbon products is apparent from the pyrolysis-GC traces. The richer mudstones at 1900-1950± metres have a potential for gas-condensate but the section down to 3708± metres is generally gas prone. Pyrolysis products of the Nesna shales consist of methane and a series of heavier hydrocarbons extending out to nC_{25} . The alkene-alkane double peaks indicate that these shales would, if mature, generate medium gravity crude oil in addition to gas and condensate. Interbeds of shale and silt within the Tomma have a primary potential for gas and associated liquids whereas those in Leka would generate gas/condensate and associated light oil in the mature state. Silty shales in the Aldra are capable of generating gas and associated light liquids with traces of oil. Strong single alkane peaks are visible on many of the pyrograms from the sediments below 3718 metres. They are due to persistent traces of drilling introduced contamination.

Summarising:

- Zones A-C (Alstahaug-Finnvaer) have a poor potential for gas, with minor good interbeds at 1900-1950± metres
- the Nesna shales/shaly mudstones at 3708-3718 metres are rich and have a potential for gas-condensate and associated crude oil
- interbeds of shale in the Engelvaer are poor, with fair and good interbeds, source rocks for gas and associated liquids
- scattered shales, siltstones and silty shales within the Tomma-Aldra formations (below 3822 metres) are commonly fair, with good interbeds. In general they have a potential for gas-condensate, with trace of associated oil in the 3940-4220± metres interval.

E. MIGRATED HYDROCARBONS

Sands, representing potential reservoir facies, are present above 1700± metres but are more abundant in the Middle-Lower Jurassic below 3820± metres.

Enhanced gas wetness and light hydrocarbon abundances at 2500-2700± metres suggest that migrated hydrocarbons are present in the shales and silts at this depth. The C_{15+} hydrocarbons 165-224 ppm indicate a fair show (at best below 2600± metres) of light-medium gravity crude oil.

Intermittant traces of wet gas were detected down to 3650 metres but the heavier hydrocarbons are sparse and consist chiefly of mud additives and immature source indigenous species. Shows of wet gas-condensate in the basal Finnvaer (below 3650± metres) appear to be a diffusion halo from the shows in the Nesna.

Shows in the shaly mudstones and shales within the Nesna are strong consisting of wet gas-condensate with associated light-medium gravity crude oil. Weaker shows of similar hydrocarbons increase in strength from poor to fair (below 2800± metres) in the Engelvaer. Traces of crude oil are suspected but the odd carbon paraffin preference and low hydrocarbon to total extract ratios below 3750± metres are due to indigenous not migrated species.

The Tomma Formation, consisting of sands with interbedded silty shales and mudstones, is characterised by good accumulations of wet gas - condensate below 3940± metres. Heavy drilling introduced contamination (massive naphthenic hump in the saturates chromatogram) has distorted the C_{15+} hydrocarbon data. Shows of medium gravity crude oil are, nonetheless, suggested by the $C_{15}-C_{25}$ hydrocarbon distributions in the cuttings extracts; and by the saturates extracted from the core at 3921.99 metres. The shows within the Tomma are, thus, of wet gas - condensate and associated crude oil, and are strongest below 3940± metres.

Apart from kicks at 4020-4030± metres and at 4060-4070± metres hydrocarbon gases with the Leka (4013-4146 metres) are only of fair abundance. They are, however, very wet and particularly below 4060± metres are associated with good abundances of gasoline range hydrocarbons. C_{15+} hydrocarbons extracted from the cuttings samples within this interval contain a high proportion of

contamination - resembling that in the Tomma samples. Analyses of the core samples at 4116 metres and 4129 metres (where contamination is minimal) indicate that shows of migrated crude oil are present, nonetheless.

Fairly strong shows of migrated hydrocarbons in the Aldra are indicated by the light hydrocarbons abundances at 4150-4160± metres, 4170-4180± metres and below 4240± metres. The cuttings from this formation are also contaminated but the core samples analysed in the Correlation Study (Geochem, September 1985) confirm that good shows of migrated crude oil are present in this interval.

Carbon isotope ratios of the C_{15+} total extracts, and saturated and aromatic hydrocarbons, fall into two groups. Delta values of $-31^0/00$ apply to the Nesna shale extracts whilst their saturated and aromatic hydrocarbons have values of -31.56 to $-31.57^0/00$ and -30.91 to $-30.74^0/00$. These values are appreciably lighter than the corresponding ratios for the remaining sediments. With two anomalous exceptions (due to low sample weights?) most of the total extract and hydrocarbon ratios cluster about -27 to $-29^0/00$. Included within this range are delta values from core samples (where contamination is minimal) and cuttings (affected by mud additives - see above). The more reliable data from the uncontaminated samples suggest that the shows of oil in the Middle - Lower Jurassic are not, apparently, correlated to the oil detected in the Nesna shales.

Mass fragmentograms of the triterpanes (m/z 191) between 2860± metres and 3290± metres have strong C_{30} hopane peaks but few of the higher hopanes. The corresponding sterane traces have abundant C_{27} isomers above 3000± metres whilst the C_{29} components predominate below this depth. S:R sterane and hopane ratios indicate that these hydrocarbons have immature features - suggesting that they are indigenous. A show of crude oil at 2500-2700± metres produced mass fragmentograms with a unique fingerprint. They do not correlate with the shows in the Nesna nor those in the Middle-Lower Jurassic sands.

Correlations, by means of mass fragmentograms, between the shows in the Nesna mudstones and those in the relatively uncontaminated samples (at 3726.0 metres, 3500-3810± metres, 3922 metres, 4110-4120± metres, 4116 metres and 4129 metres) have been investigated. Triterpanes isolated from the Nesna mudstones (part migrated crude oil and part indigenous) have a prominent C_{30} hopane peak, S:R hopane ratios which suggest a mature source and hopenes?. The C_{27} steranes are relatively abundant (at m/z 217 and 218) - suggesting a

significant contribution from marine organic matter. Similar hydrocarbons to those in the Nesna mudstones occur at $3726 \pm$ metres in the Engelvaer. Hydrocarbons extracted from the contaminated samples below $3820 \pm$ metres are relatively depleted in the C_{28} steranes, have strong C_{28} bisnorhopane peaks and generally show a degree of similarity which indicates a common "source". This effect may be due to the highly naphthenic contamination, observed in the saturates chromatograms, but features in the fragmentograms, which are similar to those from the core samples, suggest that they may be associated with shows of crude oil. If the mass fragmentograms of the uncontaminated samples are compared with those from the Nesna there are minor differences - enhancement of bis norhopane (at m/z 177), stronger moretane peaks (at m/z 191) - which suggest a slight variation in inferred source facies. Allowing for the effects of contamination, therefore, it is almost certain that the shows of oil in the Nesna correlate with those in the Middle - Lower Jurassic. The discrepancy in the carbon isotope data is attributed to variations in source facies, is consistent with the mass fragmentograms and does not imply a disparate source for the shows in the Engelvaer - Aldra formations.

Dibenzothiophene fragmentograms (m/z 184, 198 and 212) like the Nesna shows with the traces of crude oil detected in the Engalvaer. More significantly, similar fragmentograms were obtained for the shows in the Tomma-Aldra formations. This correlation based upon "contaminated" cuttings and uncontaminated core samples suggests that the drilling introduced hydrocarbons occur chiefly in the saturates fraction. This conclusion is consistent with the very high saturate to aromatic hydrocarbon ratios for these samples. It would appear, therefore, that shows of migrated hydrocarbons in the Tomma-Aldra formations have similar dibenzothiophene fingerprints and belong to the same family of crude oils. Their similarity to the hydrocarbons in the Nerna suggests that these mudstones may in fact be the source of the deeper shows. The corresponding phenanthrene series fragmentograms (m/z 178-220) from the Jurassic sediments also display a degree of similarity but the trimethyl phenanthrenes differ appreciably and appear to be effected by contamination. Qualitatively they support the dibenzothiophene data.

Summarising:

- fair shows of migrated crude oil were detected in the mudstones at 2500-2700± metres
- traces of wet gas are present down to 3708 metres
- strong shows of wet gas - condensate and of associated light - medium gravity crude oil were observed in the Nesna shales at 3708-3718± metres
- shows of wet gas and associated light liquids occur in the Engelveer, with traces of light crude oil down to 3750± metres
- cuttings samples from the Tomma - Aldra formations 3822-4302 metres are contaminated by a naphthenic mud additive. There are nonetheless good shows of wet gas - condensate and of a light - medium gravity crude oil throughout this interval
- shows of wet gas and associated liquids were detected in the Hitra sands.

F. CONCLUSIONS

The section between 950 metres and 4360 metres has, for the purposes of this study, been divided into eight (8) zones.

Zone A lies between 950 metres and 2278 metres. Sands and light olive grey silty mudstones with traces of basalt pass below 1900± metres to interbedded very light brownish grey shaly mudstones and light olive grey shales. Organic carbon contents improve to 1.00–2.68% at 1850–2210± metres but are below average (0.15–0.87%) elsewhere. In general organic matter derived from land plants is a mixture of woody herbaceous and inertinitic debris. Somewhat better quality kerogen below 1900± metres results in fair and good mudstones at 1900–1950± metres. With these exceptions Zone A has a poor potential for gas, and is immature throughout.

Zone B¹ (2278–2500± metres) covers the Bodo Formation (down to 2332 metres) and the top of the Flatoey Group. Very light brownish grey and olive grey mudstones overlie medium grey to medium light grey shales at 2400± metres. Below average (less than 0.97% organic carbon) contents of immature woody and inertinitic organic matter in these sediments have a minimal potential for gas. Zone B¹ therefore lacks effective source rocks.

Zone B² is equivalent to the lower part of the Flatoey Group and extends from 2500± metres down to 3146 metres. Silty mudstones and silts, grading to sands at 2680–2690± metres, are present above 2700± metres but this interval is dominated by medium grey mudstones. Organic carbon contents of 0.70–1.04% improve minimally below 2900± metres although the organic matter, consisting mainly of wood and inertinite, has a negligible hydrocarbon potential. The Flatoey Group sediments are poor, immature and gas prone source rocks.

Zone C (3146–3708 metres) corresponds to the Finnvaer Group whose sediments comprise medium grey mudstones and shales with brownish grey silty mudstones and, below 3600± metres, limestones. Organically these sediments resemble those in Zone B² in richness (0.73–1.34% organic carbon) and organic matter type. Zone C is, therefore, rated as a poor and effectively immature gas source.

Zone D (3708–3822 metres) includes the Nesna and, below 3720 metres, the Engelvær formations. The Nesna is dominated by dark grey to medium dark

grey shaly mudstones which are rich (5.8–8.46% organic carbon) in amorphous and algal kerogen. They have an excellent potential for gas condensate and associated light to medium gravity oil. On structure these shaly mudstones are generating significant volumes of hydrocarbons; burial to approximately 4100± metres would be necessary to achieve oil window maturity.

Interpretation of the Engalvaer is complicated by the presence of substantial amounts of caved medium dark grey shale in the samples and by the fact that the sidewall cores are medium dark grey shales or shaly mudstones whereas the mudstones in the cuttings samples have a silty texture. The latter effect may be due to turbo-drilling which finishes at the base of this interval. Although the mudstones generally have good (0.80–2.46%) organic carbon contents their organic matter, consisting of wood and inertinite with herbaceous kerogen, has a poor hydrocarbon potential in all but of few scattered fair interbeds. Shales represented by the sample at 3745 metres have a good potential for gas and condensate but the Engalvaer overall is a poor, fair at best, source for gas.

Zone E¹, 3822 metres down to 4013 metres, is equivalent to the Tomma Formation; comprising the Upper Sandstone, Siltstone (at 3908–3947 metres) and Lower Sandstone members. Dark grey to medium dark grey shales and siltstones in the sands above 3947 metres, and brownish grey silty shales in the underlying sands generally have good (up to 3.95%) organic carbon values. Minor coals at 3940–3960± metres are rich containing 65.9–67.0% organic carbon. Organic matter in the shales and silts is a mixture of woody, inertinitic and herbaceous kerogen, effectively marginally mature (determined by the maturity of the wood and inertinite) and has a potential for gas and condensate plus traces of oil below 3940± metres. Overall the shales and silts in the Tomma are rated as fair with good interbeds source rocks for gas and associated liquids.

Zone E² (4013–4147 metres) corresponds to the Leka Formation. Sandstones and medium dark grey to brownish grey silty shales (resembling those in the Tomma) and mudstones are present down to 4100± metres whilst medium dark grey siltstones and silty shales are present in the basal 40± metres. The shales and silts have good (0.80–2.53% organic carbon) contents of a mixed woody, herbaceous, inertinitic and algal organic assemblage. Above 4100± metres the shales and silts are poor source rocks with minor fair and good interbeds. The silts below this depth are generally fair with good interbeds and have a potential for gas- condensate with minor light oil. The herbaceous and algal kerogen is within the oil window below 4100± metres but the effective

maturity of these silts is determined by the woody and inertinitic organic matter; they are effectively mature (significant hydrocarbon generation).

Zone F, extending from 4147 metres down to total depth at 4360 metres, includes the Aldra Formation and the top $60\pm$ metres of the Hitra Formation. The sediments are a sequence of sandstones and medium dark grey silty shales. (minor in the Hitra). Organic carbon contents vary between 0.74% and 2.45% in the shales and they have a fair, with good interbeds, potential for gas-condensate and associated light oil. Like the Leka silts these shales are generating significant volumes of hydrocarbons on structure.

A show of light-medium gravity crude oil and associated wet gas was detected in the shales and silts at 2500-2700 $\pm$ metres. Traces of wet gas occur intermittantly down to 3650 metres with stronger shows, due to a diffusion halo from the Nesna, in the basal 60 $\pm$ metres.

Strong shows of wet gas - condensate and of light - medium gravity crude oil were detected in the shaly mudstones of the Nesna (3708-3720 $\pm$ metres). Significant generation is occurring in the host sediments but the maturity of the oils suggests that a substantial proportion of these hydrocarbons have migrated from the mature down dip equivalents of the Nesna.

Relatively weak shows of wet gas, associated light liquids and traces of crude oil were detected in the Engelvaer.

Fairly strong shows of wet gas - condensate are present in the Tomma; notably above 3900 $\pm$ metres and below 3940 $\pm$ metres. The heavier hydrocarbons from the ditch cuttings are masked by drilling introduced hydrocarbons (naphthenic hump in the saturates chromatograms). They do, nonetheless, contain evidence of traces of crude oil and this is confirmed by analyses based upon the core sample at 3922 metres (and those analysed in the Correlation Study, Geochem September 1985).

Shows of wet gas and associated light liquids in the Leka (4013-4147 metres) and Aldra (4147-4302 metres) formations are widely distributed but are not particularly strong. The cuttings samples are contaminated but analyses of the core material confirm that shows of crude oil are present below 4100 $\pm$ metres.

Carbon isotope ratios of the hydrocarbons and total extracts from the Nesna

shows are lighter (more negative) than those from the underlying sediments. Allowing for the possible interference by drilling introduced hydrocarbons the mass fragmentograms do, nonetheless, correlate the shows in the Engeltaer-Aldra formations with those in the Nesna. Their common source is believed to be the mature equivalents of the Nesna shaly mudstones.

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)
1106-002	950-1000m	A 60% LCM - cement B 30% Sand, unconsolidated, medium grained, N9 sub-angular to sub-rounded, poorly sorted, clear, white C 10% Basalt, blocky, hard, greyish black N2		
1106-004	1100-150m	A 50% Silty mudstone, blocky, soft, sl. calc., medium light grey to light olive grey B 40% Sand, as 1106-002B C 10% Basalt, as 1106-002C Minor shell fragments	N6- 5Y6/1 N9 N2	0.37
1106-006	1200-250m	A 60% Sand, unconsolidated, coarse grained, N9 sub-angular to sub-rounded, poorly sorted, clear, white B 35% Silty mudstone, as 1106-004A, minor cavings C 5% Basalt, as 1106-002C Minor shell fragments	N6- 5Y6/1 N2	0.43
1106-008	1300-350m	A 55% Sand, as 1106-006A B 40% Silty mudstone, as 1106-004A, minor cavings C 5% Basalt, as 1106-002C Minor shell fragments	N9 N6- 5Y6/1 N2	0.37, 0.36
1106-010	1400-450m	A 65% Silty mudstone, as 1106-004A, minor cavings B 30% Sand, as 1106-006A C 5% Basalt, as 1106-002C Minor shell fragments	N6- 5Y6/1 N9 N2	0.39
1106-012	1500-550m	A 70% Silty mudstone, as 1106-004A, minor cavings B 25% Sand, as 1106-006A C 5% Basalt, as 1106-002C Minor LCM - walnut shell	N6- 5Y6/1 N9 N2	0.48
1106-014	1600-650m	A 70% Silty mudstone, blocky, soft, sl. calc., minor cavings, light olive grey B 10% Sand, as 1106-006A C 10% LCM - walnut shell	5Y6/1 N9	0.76
1106-016	1700-750m	A 90% Silty mudstone, as 1106-014A, minor to sig. cavings B 10% Sand, as 1106-006A Minor basalt Minor LCM	5Y6/1 N9	0.66
1106-018	1800-850m	A 90% Silty mudstone, as 1106-014A, minor cavings B 10% LCM - walnut shell Minor sand and basalt	5Y6/1	0.83
1106-020	1900-950m	A 80% Shaly mudstone, subfissile, soft to mod. hard, non-calc., minor cavings, v. light brownish grey	5YR7/1	2.66, 2.70

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

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GEOCHEM SAMPLE NUMBER	DEPTH		GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1106-020	1900-950m	B 20%	Silty mudstone, blocky, soft, to mod. hard, non-calc., minor cavings, olive grey to medium olive grey Minor sandstone and basalt	5Y4/1- 5Y5/1	1.46
1106-022	2000-010m	A 90%	Shaly mudstone, subfissile, soft to mod. hard, non-calc., minor cavings, v. light brownish grey	5YR7/1	1.22
		B 10%	Silty mudstone, as 1106-020B, abundant cavings	5Y4/1- 5Y5/1	2.64
1106-032	2100-110m	A 55%	Shale, platy, mod. hard, non-calc., light olive grey	5Y6/1	1.00
		B 40%	Shaly mudstone, as 1106-022A, sig. cavings	5YR7/1	
		C 5%	Silty mudstone, as 1106-020B, abundant cavings	5Y4/1- 5Y5/1	2.35
1106-042	2200-210m	A 55%	Shale, as 1106-032A, sig. cavings	5Y6/1	1.00
		B 45%	Shaly mudstone, as 1106-022A, sig. to abundant cavings Minor other mudstone	5YR7/1	0.29
1106-045	2230-240m	A 55%	Shale, as 1106-032A, sig. cavings	5Y6/1	0.87
		B 30%	Shaly mudstone, as 1106-022A, sig. cavings	5YR7/1	0.36
		C 10%	Silty mudstone, blocky, soft, non-calc., minor cavings, olive grey	5Y4/1	0.62,0.63
		D 5%	Mudstone, blocky to subfissile, soft to mod. hard, non-calc., minor cavings, greyish red	5R4/2	0.15
1105-048	2260-270m	A 60%	Silty mudstone, as 1106-045C, minor cavings	5Y4/1	0.81
		B 40%	Shaly mudstone, as 1106-022A, sig. cavings Minor chert and other mudstone	5YR7/1	0.18
1106-255 SWC	2285.0m	A 98%	Shaly mudstone, subfissile, soft, non-calc., olive grey	5Y4/1	0.20
1106-051	2290-300m	A 60%	Mudstone, blocky, soft, non-calc., minor to sig. cavings, olive grey	5Y4/1	0.27
		B 40%	Shaly mudstone, as 1106-022A, sig. to abundant cavings	5YR7/1	0.16,0.16
1106-054	2320-330m	A 95%	Shaly mudstone, subfissile to blocky, soft to mod. hard, non-calc., olive grey	5Y4/1	0.97
		B 5%	Shaly mudstone, as 1106-022A, abundant cavings Minor other mudstone	5YR7/1	0.24
1106-256 SWC	2330.0m	A 98%	Shaly mudstone, subfissile, soft, non-calc., medium dark grey	N4	0.91
1106-257 SWC	2340.0m	A 98%	Mudstone, subfissile, shaly, soft, non-calc., medium grey to medium olive grey	N5- 5Y5/1	0.47,0.47

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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)
1106-057	2350-360m	A 65% Shaly mudstone, subfissile to blocky, soft to mod. hard, non-calc., minor cavings, olive grey	5Y4/1	0.84
		B 35% Shaly mudstone, blocky to subfissile, soft to mod. hard, non-calc., minor cavings, light grey Minor other mudstone and pyrites	N7	0.28
1106-060	2380-390m	A 60% Shaly mudstone, blocky to subfissile, soft to mod. hard, non-calc., minor cavings, light grey		0.30
		B 40% Shaly mudstone, subfissile to blocky, soft to mod. hard, non-calc., olive grey Minor pyrites and other mudstone	5Y4/1	0.88,87
1106-258 SWC	2400.0m	A 98% Shaly mudstone, subfissile, soft, non-calc., medium grey to medium olive grey	N5- 5Y5/1	0.44
1106-063	2410-420m	A 80% Shale, platy to subfissile, soft to mod. hard, non-calc., sig. cavings, medium grey to medium light grey	N5-6	0.88
		B 20% Shaly mudstone, as 1106-060A, minor cavings Minor pyrites	N7	0.28
1106-066	2440-450m	A 85% Shale, as 1106-063A, sig. cavings	N5-6	0.66
		B 15% Shaly mudstone, blocky, soft, non-calc., sl. silty, medium grey to medium light grey Minor pyrites	N5-6	0.67
1106-069	2470-480m	A 80% Shale, as 1106-063A, sig. cavings	N5-6	0.68,0.68
		B 20% Shaly mudstone, as 1106-066B, minor to sig. cavings Minor pyrites and other caved mudstone	N5-6	0.73
1106-259 SWC	2494.9m	A 98% Mudstone, subfissile, soft, non-calc., silty in part, olive grey to light olive grey	5Y4/1- 5Y6/1	0.71
1106-260 SWC	2550.0m	A 98% Silty mudstone, subfissile, soft, non-calc., medium grey	N5	0.70
1106-072	2500-510m	A 70% Shale, as 1106-063A, sig. cavings	N5-6	0.81
		B 30% Shaly mudstone, as 1106-066B, minor to sig. cavings Minor LCM - metal	N5-6	1.03
1106-075	2530-590m	A 60% Shaly mudstone, as 1106-066B, minor cavings	N5-6	0.88
		B 40% Shale, as 1006-063A, sig. cavings	N5-6	0.79,0.80
1106-078	2560-570m	A 70% Silty mudstone, blocky, soft to mod. hard, non-calc., minor cavings, medium grey	N5	0.95

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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)
1106-078	2560-570m	B 30% Shale, platy to fissile, mod. hard, non-calc., medium grey Minor other mudstone	N5	0.75
1106-081	2590-600m	A 75% Silty mudstone, blocky, soft to mod. hard, non-calc., minor cavings, medium grey	N5	0.88,0.88
		B 25% Shale, as 1106-078B, sig. cavings Minor claystone	N5	0.79
1106-261 SWC	2600.0m	A 98% Silty mudstone, subfissile, soft, non-calc., light grey to medium light grey	N7-6	1.00
1106-084	2620-630m	A 70% Silty mudstone, as 1106-081A, sig. cavings	N5	0.93
		B 30% Shale, as 1106-078B, sig. cavings	N5	0.83
1106-087	2650-660m	A 75% Mudstone, blocky, soft, non-calc., minor cavings, medium grey	N5	0.85
		B 15% Shale, as 1106-078B, sig. cavings	N5	0.93
		C 10% Silty mudstone, as 1106-081A, sig. cavings	N5	0.70,0.69
1106-090	2680-690m	A 60% Siltstone, blocky, soft, non-calc., grades to fine sandstone, minor cavings, medium grey	N5	0.89
		B 40% Silty mudstone, shaly in part, subfissile to blocky, soft, non-calc., medium grey Minor sand and pyrites	N5	0.80
1106-262 SWC	2700.0m	A 98% Silty mudstone, subfissile, soft, non-calc., medium grey	N5	0.85
1106-093	2710-720m	A 60% Shaly mudstone/claystone, subfissile to blocky, soft to mod. hard, non-calc., sig. cavings, medium grey to light olive grey	N5- 5Y6/1	0.52
		B 40% Mudstone, blocky, soft, sl. silty, non-calc., minor cavings, medium grey Minor other siltstone and sand	N5	0.76
1106-096	2740-750m	A 50% Shaly mudstone, as 1106-093A, sig. cavings	N5- 5Y6/1	0.62,0.63
		B 50% Mudstone, as 1106-093B, minor cavings Minor fibrous/columnar calcite	N5	0.80
1106-099	2770-780m	A 60% Mudstone, as 1106-093B, minor to sig. cavings	N5	0.84
		B 40% Shaly mudstone, as 1106-093A, sig. cavings Minor calcite and other mudstone	N5	0.76
1106-263 SWC	2800.0m	A 98% Shaly mudstone, subfissile, soft, non-calc., medium light grey to medium grey	N6-5	0.91,0.89

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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)
1106-102	2800-810m	A 60% Mudstone, blocky, soft, sl. silty, non-calc., minor cavings, medium grey	N5	0.88
		B 40% Shaly mudstone/claystone, subfissile to blocky, soft to mod. hard, non-calc., sig. to abundant cavings, medium grey to light olive grey Minor other caved mudstone	N5- 5Y6/1	0.52
1106-105	2830-840m	A 55% Mudstone, as 1106-102A, minor cavings	N5	0.88,0.90
		B 45% Shaly mudstone, as 1106-102B, sig. cavings Minor other caved mudstone	N5	0.78
1106-108	2860-870m	A 85% Mudstone/claystone, blocky, soft, non-calc., minor cavings, medium grey	N5	0.93
		B 15% Shaly mudstone, as 1106-105B, sig. cavings Minor other caved mudstone	N5	0.82
1106-111	2890-900m	A 60% Shaly mudstone, subfissile, mod. hard, non-calc., abundant cavings, medium grey	N5	0.82
		B 40% Mudstone, as 1106-108A, sig. cavings Minor other mudstone	N5	0.81,0.82
1106-114	2920-930m	A 85% Mudstone, as 1106-108A, minor cavings	N5	0.95
		B 15% Shaly mudstone, as 1106-111A, abundant cavings	N5	0.91
1106-117	2950-960m	A 50% Mudstone, as 1106-108A, minor cavings	N5	0.89
		B 50% Shaly mudstone, as 1106-111A, abundant cavings	N5	0.81
1106-120	2980-990m	A 95% Mudstone, as 1106-108A, minor cavings	N5	0.97
		B 5% Shaly mudstone, as 1106-111A, abundant cavings	N5	
1106-123	3010-020m	A 98% Mudstone, blocky, soft, non-calc., minor cavings, medium grey Minor other mudstone	N5	1.00,0.98
1106-125	3040-050m	A 98% Mudstone, as 1106-123A, minor cavings Minor other mudstone	N5	0.96
1106-128	3070-080m	A 98% Mudstone, as 1106-123A, minor cavings Minor other caved mudstone	N5	1.02
1106-131	3100-110m	A 98% Mudstone, as 1106-123A, minor cavings Minor other mudstone	N5	1.04
1106-134	3120-130m	A 98% Mudstone, blocky, soft, non-calc., medium dark grey to medium grey Minor other mudstone	N4-5	1.02
1106-264 SWC	3150.0m	A 98% Shaly mudstone, subfissile to platy, soft, non-calc., medium grey	N5	0.69
1106-137	3160-170m	A 90% Mudstone, as 1106-134A, sig. cavings	N4-5	1.32,1.34
		B 5% Sandstone, blocky, hard, non-calc., turbo-drilled, v. light grey to white	N8-9	

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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)
1106-137	3160-170m	C 5%	Lignite, blocky, soft, - LCM?, dark brownish grey	5YR3/1	
1106-265 SWC	3163.0m	A 98%	Sandstone, blocky, fine grained, sub-angular, well sorted, non-calc. matrix, sl. arg. in part, white to v. light brownish grey	N9- 5YR7/1	0.46
1106-140	3190-200m	A 90%	Mudstone/claystone, soft, non-calc., minor cavings, medium grey	N5	0.95
		B 10%	Shaly mudstone, platy, mod. hard, non-calc., sig. cavings, medium grey Minor sand, LCM - lignite	N5	0.87
1106-266 SWC	3208.0m	A 95%	Shaly mudstone, subfissile, soft, non-calc., medium grey	N5	0.26
		B 5%	Limestone, blocky, soft, white	N9	0.12
1106-143	3220-230m	A 65%	Mudstone, as 1106-140A, sig. cavings	N5	1.02
		B 25%	Shaly mudstone?, blocky, mod. hard, non-calc., turbo-drilled, medium dark grey	N4	0.87
		C 10%	Shaly mudstone, as 1106-140B, abundant cavings Minor sand/limestone and lignite	N5	1.05
1106-146	3250-260m	A 80%	Mudstone, as 1106-140A, minor cavings	N5	0.91,0.93
		B 15%	Shale, thinly fissile, mod. hard, non-calc., sig. cavings, medium grey	N5	0.90
		C 5%	Shaly mudstone, as 1106-143B Minor lignite - LCM?	N5	
1106-149	3280-290m	A 80%	Mudstone, as 1106-140A, minor cavings	N5	1.04
		B 10%	Shale, as 1106-146B, sig. cavings	N5	1.01
		C 10%	Shaly mudstone, as 1106-143B, sig. cavings Minor lignite - LCM?	N5	0.93
1106-152	3310-320m	A 55%	Mudstone, as 1106-140A, minor cavings	N5	0.96,0.94
		B 35%	Shaly mudstone, as 1106-143B, sig. cavings	N5	0.89
		C 10%	Shale, as 1106-146B, sig. cavings Minor lignite	N5	0.96
1106-155	3340-350m	A 60%	Mudstone, as 1106-140A, minor cavings	N5	0.96
		B 25%	Shaly mudstone, as 1106-143B, sig. cavings	N5	0.93
		C 15%	Shale, as 1106-146B, sig. cavings Minor other mudstone and lignite	N5	0.97
1106-158	3370-380m	A 50%	Mudstone?, blocky, mod. hard, non-calc., turbo-drilled, medium dark grey to medium grey	N4-5	0.81
		B 35%	Mudstone/claystone, soft, non-calc., sig. cavings, medium grey	N5	0.84
		C 15%	Shale, thinly fissile, mod. hard, non-calc., sig. cavings, medium grey Minor other mudstone and lignite	N5	0.85

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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)
1106-161	3400-410m	A 60% Mudstone, blocky, soft to mod. hard, non-calc., abundant cavings, medium light grey to light olive grey	N6- 5Y6/1	0.76
		B 40% Shale, platy to thinly fissile, mod. hard, non-calc., abundant cavings, medium grey Minor other mudstone and lignite	N5	0.91, 0.90
1106-164	3430-440m	A 60% Mudstone, blocky, soft to mod. hard, non-calc., minor cavings, medium grey	N5	1.09
1106-164	3430-440m	B 30% Shale, thinly fissile to platy, mod. hard, non-calc., sig. cavings, medium grey	N5	0.87
		C 10% Mudstone, as 1106-158A, minor to sig.?, cavings Minor lignite and other mudstone	N4-5	1.20
1106-167	3460-470m	A 65% Silty mudstone, blocky, mod. hard, non-calc., turbo-drilled, medium grey	N5	0.80
		B 20% Mudstone, as 1106-164A, sig. cavings	N5	0.91, 0.91
		C 15% Shale, as 1106-164B, abundant cavings	N5	0.92
1106-170	3490-500m	A 65% Silty mudstone, as 1106-167A	N5	0.84
		B 20% Mudstone, as 1106-164A, sig. cavings	N5	0.86
		C 15% Shale, as 1106-164B, sig. cavings Minor other shale	N5	0.92
1106-173	3520-530m	A 65% Silty mudstone, as 1106-167A, minor cavings	N5	0.91
		B 20% Shale, as 1106-164B, sig. cavings	N5	0.87, 0.89
		C 15% Mudstone, as 1106-164A, sig. cavings	N5	1.04
1106-176	3550-560m	A 40% Mudstone, blocky, soft, non-calc., minor cavings, medium grey	N5	0.90
		B 35% Silty mudstone, as 1106-167A, minor cavings	N5	0.97
		C 25% Shale, as 1106-164B, sig. cavings	N5	0.85
1106-178	3520-590m	A 40% Mudstone, as 1106-176A, minor cavings	N5	0.85
		B 30% Silty mudstone, as 1106-167A, minor cavings	N5	0.78, 0.79
		C 30% Shale, as 1106-164B, sig. cavings Minor red mudstone	N5	1.05
1106-181	3610-630m	A 40% Silty mudstone, blocky, mod. hard, non-calc. to sl. calc., minor cavings, medium dark grey to brownish grey	N4- 5YR4/1	0.93
		B 30% Mudstone, blocky, soft, v. sl. calc. to non-calc., minor cavings, medium dark grey	N4	0.86
		C 30% Shale, platy to thinly fissile, mod. hard, non-calc., sig. to abundant cavings, medium dark grey	N4	0.75

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GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1105-184	3640-650m	A 40% Shale, platy to thinly fissile, mod. hard, non-calc., sig. to abundant cavings, medium dark grey	N4	0.82,0.82
		B 35% Mudstone, blocky, soft, non-calc., minor cavings, greyish red	5R4/2	0.30
		C 25% Silty mudstone, blocky, mod. hard, non-calc. to sl. calc., minor cavings, medium dark grey to brownish grey Minor other mudstone	N4- 5YR4/1	0.73
1106-187	3670-680m	A 50% Shale, as 1106-184A, sig. cavings	N4	0.88
		B 45% Silty mudstone, as 1106-184C, minor cavings	N4- 5YR4/1	1.87
		C 5% Shale, platy, mod. hard, non-calc., minor cavings, greyish red Minor other mudstone	5R4/2	0.23
1106-190	3700-710m	A 50% Shale, as 1106-184A, abundant cavings	N4	1.37,1.38
		B 20% Mudstone, blocky, soft to mod. hard, sl. calc., turbo-drilled in part, minor cavings, greyish red	5R4/2	0.18
		C 20% Limestone?, blocky to platy, mod. hard, turbo-drilled, v. light grey to light grey	N8-7	0.24
		D 10% Mudstone, blocky, soft, non-calc., turbo-drilled in part, olive grey Minor other mudstone and lignite	5Y4/1	7.01
1106-267 SWC	3706.0m	A 98% Limestone, blocky, mod. hard, light grey to v. light grey	N7-8	0.09,0.09
1106-268 SWC	3708.0m	A 98% Mudstone, subfissile to blocky, soft to mod. hard, sl. calc., medium light grey	N6	0.13
1106-269 SWC	3710.0m	A 98% Shale, platy to subfissile, mod. hard, non-calc., medium dark grey	N4	1.55
1106-191	3710-720m	A 85% Shale, platy to subfissile, mod. hard, non-calc., abundant cavings, medium dark grey	N4	1.08
		B 15% Mudstone, as 1106-190D Minor other mudstone and lignite	5Y4/1	5.82,5.80
1106-270 SWC	3712.0m	A 98% Shaly mudstone, subfissile, mod. hard, non-calc., medium dark grey	N4	5.89
1106-271 SWC	3714.0m	A 98% Shaly mudstone, as 1106-270A	N4	8.46
1106-272 SWC	3716.0m	A 98% Shaly mudstone, subfissile, mod. hard, non-calc., dark grey to medium dark grey	N3-4	7.08
1106-273 SWC	3718.0m	A 98% Shaly mudstone, subfissile, mod. hard, non-calc., medium dark grey	N4	7.24,7.28

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)
1106-192	3720-730m	A 60% Shale, platy to subfissile, mod. hard, non-calc., abundant cavings, medium dark grey	N4	0.89
		B 40% Mudstone, blocky, soft, non-calc., minor cavings, medium olive grey to olive grey Minor turbo-drilled mudstone, other mudstone and lignite	5Y5/1- 5Y4/1	1.43
1106-274 SWC	3720.0m	A 98% Shale, subfissile, soft, non-calc., medium dark grey to olive grey	N4- 5Y4/1	1.21
1106-275 SWC	3722.0m	A 98% Shaly mudstone, subfissile to platy, soft to mod. hard, non-calc., medium dark grey to dark grey	N4-3	1.71
1106-276 SWC	3726.0m	A 98% Shaly mudstone, platy to subfissile, soft, non-calc., medium grey	N5	1.93
1106-193	3730-740m	A 60% Mudstone, as 1106-192B, minor cavings	5Y5/1- 5Y4/1	1.54
		B 30% Shale, as 1106-192A, abundant cavings	N4	1.44
		C 10% Silty mudstone, blocky, hard, non-calc., turbo-drilled, medium dark grey Minor other mudstone and lignite	N4	1.44
1106-277 SWC	3745.0m	A 98% Shale, platy, mod. hard, non-calc., medium dark grey	N4	2.15
1106-194	3740-750m	A 60% Mudstone, as 1106-192B, minor cavings	5Y5/1- 5Y4/1	1.70, 1.69
		B 25% Shale, platy to subfissile, mod. hard, non-calc., abundant cavings, medium dark grey	N4	1.03
		C 15% Silty mudstone, blocky, hard, non-calc., turbo-drilled, minor cavings, medium dark grey Minor lignite and other mudstone	N4	1.54
1106-195	3750-760m	A 45% Silty mudstone, as 1106-194C, minor cavings	N4	1.23
		B 35% Mudstone, blocky, soft, non-calc., minor cavings, medium olive grey to olive grey	5Y5/1- 5Y4/1	1.05
		C 20% Shale, as 1106-194B, abundant cavings Minor lignite and other mudstone	N4	0.95, 0.97
1106-196	3760-770m	A 80% Silty mudstone, as 1106-194C, minor cavings	N4	0.86
		B 20% Shale, as 1106-194B, abundant cavings Minor other mudstone and lignite	N4	0.88
1106-278 SWC	3764.9m	A 98% Shale, subfissile, soft to mod. hard, non-calc., medium grey	N5	0.91, 0.91
1106-197	3770-780m	A 75% Silty mudstone, blocky, hard, non-calc., turbo-drilled, minor cavings, medium dark grey	N4	1.54

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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)
1106-197	3770-780m	B 15% Shale, platy to subfissile, mod. hard, non-calc., abundant cavings, medium dark grey	N4	1.04
		C 10% Mudstone, blocky, soft, non-calc., minor to sig. cavings, medium grey Minor other mudstone	N5	1.10, 1.08
1106-279 SWC	3776.0m	A 98% Shale, blocky, mod. hard, sl. silty, non-calc., medium dark grey	N4	1.02
1106-198	3780-790m	A 70% Silty mudstone, blocky, hard, non- calc., turbo-drilled, minor cavings, medium dark grey	N4	1.27
		B 20% Shale, as 1106-197B, abundant cavings	N4	0.86
		C 10% Mudstone, as 1106-197C, minor to sig. cavings Minor other mudstone	N5	1.26
1106-280 SWC	3791.0m	A 98% Shale, subfissile, soft to mod. hard, sl. micaceous, non-calc., medium grey	N5	1.94
1106-199	3790-800m	A 50% Silty mudstone, as 1106-198A, minor cavings	N4	1.65
		B 25% Shale, as 1106-197B, abundant cavings	N4	0.99, 1.01
		C 25% Mudstone, as 1106-197C, minor to sig. cavings Minor other mudstone	N5	1.94
1106-200	3800-810m	A 60% Silty mudstone, as 1106-198A, minor cavings	N4	1.92
		B 25% Mudstone, as 1106-197C, minor to sig. cavings	N5	2.43
		C 15% Shale, as 1106-197B, abundant cavings Minor other mudstone	N4	1.10
1106-201	3810-820m	A 40% Mudstone, as 1106-197C, minor cavings	N5	2.48
		B 35% Silty mudstone, as 1106-194C, minor cavings	N4	1.83, 1.86
		C 25% Shale, as 1106-197B, abundant cavings Minor other mudstone	N4	1.02
1106-281 SWC	3815.0m	A 98% Shaly mudstone, subfissile, soft, non-calc., medium dark grey to brownish grey	N4- 5YR4/1	2.38
1106-282 SWC	3818.0m	A 98% Mudstone, subfissile, mod. hard, sl. silty and micaceous, non-calc., dark grey to medium dark grey	N3-4	2.44
1106-283 SWC	3822.0m	A 98% Sandstone, blocky, loosely unconsol- idated, medium grained, subangular, fairly well sorted, non-calc. matrix, sl. arg. in part?, pale milky cut, very light grey	N8	0.33, 0.33
1106-202	3820-830m	A 60% Shale, as 1106-197B, abundant to dominant cavings	N4	0.94
		B 35% Mudstone, blocky, soft, no-calc., abundant cavings, medium light grey	N6	0.97

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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)
1106-202	3820-830m	C	5% Sand, unconsolidated, medium grained, sub-angular, poorly sorted, clear, white Minor other shale and mudstone		
1105-203	3830-840m	A	60% Silty shale, subfissile, mod. hard, sl. micaceous, non-calc., minor cavings, dark grey to medium dark grey	N3-4	2.97
		B	20% LCM - cement and paint		
		C	15% Sand, as 1106-202C	N9	
		D	5% Shale, platy to subfissile, mod. hard, non-calc., dominant cavings, medium dark grey	N4	
1106-204	3840-850m	A	50% LCM - cement and paint		
		B	40% Sand, as 1106-202C	N9	
		C	10% Silty shale, as 1106-203A, minor cavings	N3-4	3.95
1106-205	3850-860m	A	85% Sand, as 1106-202C	N9	
		B	10% LCM - cement and paint		
		C	5% Silty shale, as 1106-203A, sig. cavings Minor lignite and mudstone	N3-4	
1106-206	3860-870m	A	95% Sand, as 1106-202C	N9	
		B	<5% Silty shale, as 1106-203A, sig. to abundant cavings Minor LCM	N3-4	
1106-207	3870-880m	A	98% Sand, as 1106-202C Minor shale Minor LCM	N9	
1106-208	3880-890m	A	90% Sand, unconsolidated, medium grained, sub-angular to sub-rounded, poorly sorted, clear, white	N9	
		B	5% Shale, subfissile, soft to mod. hard, sl. silty and micaceous, non-calc., minor cavings, medium dark grey	N4	2.75, 2.75
		C	5% Evaporite?, blocky, soft, white Minor grease and paint - LCM	N9	
1106-209	3890-900m	A	90% Sand, as 1106-208A	N9	
		B	5% Evaporite, as 1106-208C	N9	
		C	<5% Shale, as 1106-208B, minor cavings LCM - grease and paint	N4	
1106-210	3900-910m	E M P T Y C A N			
1106-211	3910-920m	A	55% Sand, as 1106-208A	N9	
		B	25% Evaporite, as 1106-208C	N9	
		C	15% Silty mudstone, blocky, mod. hard, non-calc., turbo-drilled - caved?, medium grey	N5	0.65
		D	<5% Shale, as 1106-208B	N4	2.43

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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)
1106-293 CORE	3921.99- 3922.0m	A 55% Sandstone, blocky to subfissile, medium grained, sub-angular, well sorted, non-calc., micaceous, pinkish grey, interbedded with B 45% Shale, platy, mod. hard, non-calc., with pyrite nodules, medium dark grey	5YR8/1 N4	3.06
1106-212	3920-930m	A 40% Sand, unconsolidated, medium grained, sub-angular, well sorted, clear, white B 30% Shale, platy to subfissile, mod. hard, non-calc., minor cavings, medium dark grey C 20% Evaporite?, blocky, soft, white D 10% Silty mudstone, blocky, mod. hard, non-calc., turbo-drilled - caved?, medium grey	N9 N4 N9 N5	2.67
1106-294 CORE	3925.88- 3925.90m	A 98% Siltstone, subfissile, mod. hard, micaceous, non-calc., pyrite nodules, medium dark grey	N4	1.39, 1.42
1105-213	3930-940m	A 60% Sandstone, blocky, medium grained, sub-angular, fairly well sorted, micaceous, non-calc. matrix, white to pinkish grey B 40% Silty shale, subfissile to platy, mod. hard, micaceous, non-calc., medium dark grey Minor LCM - paint	N9- 5YR8/1 N4	3.00
1105-214	3940-950m	A 70% Sandstone, as 1106-213A B 20% Silty shale, subfissile, soft to mod. hard, non-calc., minor cavings, brownish grey C 10% Coal, blocky, brittle, greyish black Minor LCM	N9- 5YR8/1 5YR4/1 N2	1.91 67.00
1106-215	3950-960m	A 60% Sandstone, as 1106-213A B 25% Shale, platy to thinly fissile, mod. hard, non-calc., sig. cavings, medium dark grey C 15% Silty shale, as 1106-214B, minor cavings Minor other shell and coal	N9- 5YR8/1 N4 5YR4/1	2.01 2.90, 2.86
1106-216	3960-970m	A 75% Sandstone, as 1106-213A B 20% Shale, as 1106-215B, minor to sig. cavings C 5% Coal, as 1106-214C, dominant cavings	N9- 5YR8/1 N4 N2	2.06 65.90
1106-217	3970-980m	A 85% Sandstone, mostly unconsolidated, medium grained, fairly well sorted, non-calc. matrix, white	N9	

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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)
1106-217	3970-980m	B 15% Silty shale, platy to subfissile, mod. hard, non-calc., minor cavings, medium dark grey to brownish grey Minor coal Minor LCM	N4- 5YR4/1	1.95
1106-218	3980-990m	A 85% Sandstone, mostly unconsolidated, medium grained, fairly well sorted, non-calc. matrix, white	N9	
		B 15% Silty shale, as 217B, minor cavings	N4- 5YR4/1	1.95
1106-219	3990- 4000m	A 90% Sandstone, unconsolidated, medium grained, sub-angular, well sorted, clear, white	N9	
		B 10% Silty shale, as 1106-217B, sig. cavings Minor other shale	N4- 5YR4/1	1.74
1106-220	4000-010m	A 65% Sand as 1106-219A	N9	
		B 35% Silty shale, as 1106-217B, sig. cavings Minor LCM	N4- 5YR4/1	2.34, 2.31
1106-221	4010-020m	A 60% Silty shale, as 1106-217B, sig. cavings	N4- 5YR4/1	2.24
		B 40% Sand, as 1106-219A Minor LCM	N9	
1106-295 CORE	4017.10- 4017.15m	A 98% Sandstone, blocky, fine to medium grained, sub-angular, well sorted, non-calc. matrix, minor darker arg. laminations, medium light grey to light grey	N6-7	0.25
1106-296	4017.60- 4017.66m	A 98% Sandstone, as 1106-295A	N6-7	0.33
1106-222	4020-030	A 80% Sand, as 1106-219A	N9	
		B 10% Silty shale, as 1106-218B, sig. to abundant cavings	N4- 5YR4/1	2.11
		C 10% LCM - fibre		
1106-284 SWC	4033.5m	A 98% Sandstone, fine to medium grained, blocky, loosely consolidated, glauconitic?, non-calc. matrix, poorly sorted, light olive grey	5Y5/2	0.26
1106-223	4030-040m	A 98% Sandstone, blocky, fine to medium grained, sub-angular, well sorted, non-calc. matrix, v. light grey to light grey Minor shale LCM - fibre	N8-7	
1106-224	4040-050m	A 55% Sandstone, as 1106-223A	N8-7	
		B 45% Silty shale, platy, mod. hard, sl. micaceous, non-calc., medium dark grey	N4	2.53

LCM - metal and fibre
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)
1106-225	4050-060m	A 50% Silty shale, platy, mod. hard, sl. micaceous, non-calc., sig. cavings, medium dark grey	N4	1.97
		B 40% Sandstone, blocky, fine to medium grained, sub-angular, well sorted, non-calc. matrix, v. light grey to light grey	N8-7	
		C 10% LCM - fibre		
1106-226	4060-070m	A 65% Sandstone, as 1106-225B	N8-7	
		B 35% Silty shale, platy, mod. hard, sl. micaceous, non-calc., sig. cavings, medium dark grey Minor LCM	N4	2.29
1106-285 SWC	4066.0m	A 98% Silty mudstone, subfissile, soft, non-calc., medium dark grey to brownish grey	N4- 5YR4/1	0.92
1105-227	4070-080m	A 50% Silty mudstone, subfissile, soft, non-calc., minor cavings, medium dark grey to brownish grey	N4- 5YR4/1	1.12
		B 40% Sandstone, blocky, fine to medium grained, sub-angular, fairly well sorted, sl. micaceous, non-calc. matrix, v. light grey to white	N8-9	
		C 10% Silty shale, as 1106-225B, dominant cavings	N8-7	
1106-286 SWC	4078.0m	A 98% Silty mudstone, blocky, soft, non-calc., brownish grey	5YR4/1	1.05,1.07
1106-287 SWC	4082.0m	A 98% Shale, platy, mod. hard, non-calc., medium dark grey to brownish grey	N4- 5YR4/1	1.33
1106-228	4080-090m	A 90% Silty shale, subfissile, soft to mod. hard, non-calc., minor cavings, medium dark grey to brownish grey	N4- 5YR4/1	1.40
		B 10% Sandstone, as 1106-227B Minor other shale, LCM - lignite	N8-9	
1106-229	4090-100m	A 60% Silty shale, as 1106-228A, minor cavings	N4- 5YR4/1	1.11
		B 30% Sandstone, as 1106-227B	N8-9	
		C 10% Shale, platy, mod. hard, non-calc., minor to sig.? cavings, medium dark grey to dark grey	N4-3	2.79
1106-288 SWC	4096.5m	A 98% Siltstone, blocky, soft, non-calc., medium grey	N5	0.80,0.80
1106-230	4100-110m	A 60% Sandstone, blocky, fine to medium grained, sub-angular, well sorted, non-calc. matrix, light grey	N7	
		B 30% Siltstone, blocky, soft, non-calc., grades to sandstone, minor cavings, medium grey to pinkish grey	N5- 5Y8/1	0.97
		C 5% Shale, platy, mod. hard, non-calc., sig. cavings, medium dark grey Minor lignite	N4	2.43

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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)
1106-231	4110-120m	A 80% Sandstone, blocky, fine to medium grained, sub-angular, well sorted, non-calc. matrix, light grey	N7	
		B 15% Siltstone, blocky, soft, non-calc., grades to sandstone, minor cavings, medium grey to pinkish grey	N5- 5Y8/1	1.05
		C 5% Shale, platy, mod. hard, non-calc., sig. cavings, medium dark grey Minor lignite	N4	2.35
1106-297 CORE	4116.00- 4116.05m	A 98% Siltstone, blocky to subfissile, mod. hard, non-calc., medium dark grey	N4	1.62
1106-298 CORE	4121.50- 4121.53m	A 98% Siltstone, blocky to subfissile, mod. hard, non-calc., sl. micaceous, medium dark grey	N4	1.48, 1.46
1106-299 CORE	4124.00- 4124.03m	A 98% Siltstone, blocky, mod. hard, non-calc., sl. micaceous, grades to fine sandstone, medium dark grey	N4	1.13
1106-232	4120-130m	A 85% Silty shale, platy, mod. hard, non-calc., medium dark grey	N4	2.15
		B 15% Sandstone, blocky, fine to medium grained, sub-angular, well sorted, non-calc. matrix, light grey Minor other mudstone LCM - lignite and fibre	N7	
1106-300 CORE	4126.90- 4126.93m	A 98% Siltstone, subfissile, blocky, mod. hard, non-calc., sl. micaceous, medium dark grey	N4	1.02
1105-301 CORE	4129.0- 4129.05m	A 98% Silty shale, grading to siltstone, blocky to subfissile, mod. hard, non-calc., sl. micaceous, medium dark grey	N4	1.75
1106-302 CORE	4134.0- 4134.03	A 98% Siltstone, blocky, mod. hard, non-calc., medium dark grey	N4	0.82, 0.82
1106-233	4130-140m	A 98% Sandstone, as 232B Minor siltstone and shale LCM - lignite	N7	
1105-303 CORE	4142.0- 4142.03m	A 98% Silty shale, grading to siltstone, subfissile, mod. hard, non-calc., medium dark grey	N4	1.31
1106-304 CORE	4144.0- 4144.10m	A 98% Siltstone, blocky, hard, micaceous, non-calc., medium dark grey	N4	1.04
1106-234	4150-160m	A 80% Sandstone, mostly unconsolidated, medium grained, sub-angular, well sorted, white	N9	
		B 20% Silty shale, platy, mod. hard, non-calc., sl. micaceous, minor to sig. cavings, medium dark grey LCM - lignite	N4	2.45

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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)
1106-235	4160-170m	A 98% Sandstone, silty in part, blocky, fine to medium grained, sub-angular, well sorted, arg. matrix, light grey to medium light grey Minor shale/siltstone Minor lignite	N7-6	0.74
1106-236	4170-180m	A 95% Sand, unconsolidated, medium grained, sub-angular, well sorted, clear, white B 5% Silty shale, platy, mod. hard, non-calc., medium dark grey Minor LCM	N9 N4	1.94
1106-237	4180-180m	A 95% Sand, as 1106-236A B 5% Silty shale, as 1106-236B, minor cavings Minor grease/lignite	N9 N4	2.13, 2.11
1106-305 CORE	4190.90- 4190.93m	A 98% Silty shale, grading to siltstone, blocky to subfissile, hard, non-calc., medium dark grey	N4	0.68
1106-238	4190-200m	A 90% Sand, as 1106-236A B 10% Silty shale, as 1106-236B, minor cavings	N9 N4	1.98
1106-239	4200-210m	A 90% Sand, as 1106-236A B 10% Silty shale, as 1106-236B, minor cavings	N9 N4	1.96
1105-306 CORE	4210.50- 4210.55m	A 98% Silty shale, subfissile to blocky, mod. hard, non-calc., medium dark grey	N4	1.53
1106-240	4210-220m	A 90% Sand, as 1106-236A B 5% Silty shale, as 1106-236B, minor cavings C 5% LCM - grease, lignite and paint	N9 N4	2.07
1106-241	4220-230m	A 90% Sandstone, mostly unconsolidated, medium grained, sub-angular, fairly well sorted, clear, white B 10% Silty shale, platy, mod. hard, non-calc., minor cavings, medium dark grey Minor lignite and grease	N9 N4	1.86
1106-242	4230-240m	A 90% Sandstone, as 1106-241A B 10% Shale, as 1106-241B, minor to sig. cavings Minor lignite	N9 N4	1.88, 1.90
1106-243	4240-250m	A 90% Sandstone, as 1106-241A B 10% Shale, as 1106-241B, minor cavings Minor LCM - lignite	N9 N4	2.16
1066-244	4250-260m	A 85% Sandstone, as 1106-241A B 15% Shale, as 1106-241B, minor cavings Minor lignite	N9 N4	1.93

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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)
1106-245	4260-270m	A 65% Sandstone, mostly unconsolidated, medium grained, sub-angular, well sorted, non-calc. matrix, white	N9	
		B 35% Silty shale, subfissile to platy, mod. hard, sl. micaceous, non-calc., medium dark grey Minor lignite	N4	2.07
1106-246	4270-280m	A 65% Sandstone, as 1106-245A	N9	
		B 35% Silty shale, as 1106-245B, sig. cavings Minor lignite	N4	2.10, 2.10
1106-247	4280-290m	A 85% Sandstone, as 1106-245A	N9	
		B 15% Silty shale, as 1106-245B, sig. cavings Minor lignite	N4	1.98
1106-289 SWC	4293.1m	A 98% Sandstone, blocky, fine to medium grained, sun-angular, mod. sorted, arg. matrix, v. light grey Minor shale laminations	N8	0.87, 0.87
1106-248	4290-300m	A 70% Sandstone, as 1106-245A	N9	
		B 30% Silty shale, as 1106-245B, sig. cavings Minor lignite	N4	1.92
1106-290 SWC	4301.0m	A 98% Shaly mudstone, subfissile, soft, non-calc., sl. silty, medium dark grey to medium grey	N4-5	1.48, 1.49
1106-249	4310-320m	A 80% Sandstone, mostly unconsolidated, medium grained, sub-angular, well sorted, non-calc. matrix, v. light grey to white	N8-9	
		B 20% Shale, platy, mod. hard, sl. silty, non-calc., sig. cavings, medium dark grey Minor lignite	N4	2.03
1106-250	4310-320m	A 85% Sandstone, as 1106-249A	N8-9	
		B 15% Shale, as 1106-249B, sig. cavings Minor lignite	N4	2.01
1106-251	4320-330m	A 90% Sandstone, as 1106-249A	N8-9	
		B 10% Shale, as 1106-249B, sig. cavings Minor lignite	N4	1.86
1106-252	4330-340m	A 90% Sandstone, as 1106-249A	N8-9	
		B 10% Shale, as 1106-249B, sig. cavings Minor lignite	N4	1.96
1106-291 SWC	4335.0m	A 98% Sandstone, blocky, loosely consolidated, medium grained, sub-angular, non-calc. matrix, contains mudstone, lenses, v. light grey to v. light brownish grey	N8- 5Y7/1	0.44, 0.44

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)
1106-253	4340-350m	A 95% Sand, unconsolidated, medium grained, sub-angular, well sorted, clear, white to greyish orange	N9- 10YR7/4	
		B 5% Shale, platy, mod. hard, sl. silty and micaceous, non-calc., sig. cavings, medium dark grey Minor lignite/coal?	N4	2.39
1106-292 SWC	4351.0m	A 98% Sandstone, blocky, medium grained, sub-angular, well sorted, non-calc. matrix, v. light grey to yellowish grey	N8- 5Y8/1	0.16
1106-254	4350-360m	A 95% Sand, unconsolidated, medium grained, sub-angular, well sorted, clear, white	N9	
		B <5% Shale, as 1106-253B, sig. cavings Minor coal?	N4	1.48
1106-283 SWC	3822.0m	A 98% Sandstone, blocky. loosely consolidated, medium grained, sub-angular, fairly well sorted, non-calc. matrix, sl. arg. in part?, pale milky cut, v. light grey	N8	0.33, 0.33

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1106-002	1000-1050	1473	11	26	7	22	1538	66	4.3	153	0.34
1106-004	1100-1150	953	8	2	1	1	965	12	1.2	81	0.54
1106-006	1200-1250	846	3	1	0	1	850	4	0.5	68	0.48
1106-008	1300-1350	1070	7	1	0	0	1079	8	0.8	69	0.42
1106-010	1400-1450	1350	17	2	1	1	1370	20	1.5	98	1.15
1106-012	1500-1550	726	2	1	0	0	729	3	0.4	25	1.03
1106-014	1600-1650	2771	10	4	2	1	2789	17	0.6	97	1.30
1106-016	1700-1750	1205	34	9	6	1	1255	50	4.0	32	4.33
1106-018	1800-1850	1393	32	12	10	4	1451	58	4.0	32	2.70
1106-020	1900-1950	1622	36	15	11	1	1686	64	3.8	22	8.32
1106-022	2000-2010	1700	21	8	7	1	1738	38	2.2	25	4.69
1106-032	2100-2110	1388	9	6	2	0	1405	18	1.2	31	6.10
1106-042	2200-2210	1275	33	8	3	1	1321	46	3.5	20	2.36
1106-045	2230-2240	4228	64	17	5	2	4314	86	2.0	97	2.83
1106-048	2260-2270	12523	631	323	63	66	13606	1083	8.0	579	0.95
1106-051	2290-3000	1296	28	14	3	4	1345	49	3.6	42	0.77
1106-054	2320-2330	1087	34	24	6	9	1160	74	6.3	28	0.62
1106-057	2350-2360	3284	182	137	32	46	3681	397	10.8	61	0.71
1106-060	2380-2390	1068	37	41	13	27	1185	117	9.9	125	0.47
1106-063	2410-2420	2098	165	205	56	99	2623	525	20.0	79	0.56
1106-066	2440-2450	2474	187	263	68	134	3126	652	20.9	142	0.51
1106-069	2470-2480	2177	75	105	32	72	2460	284	11.5	219	0.44
1106-072	2500-2510	20	7	8	11	35	82	62	76.0	1288	0.32
1106-075	2530-2540	727	122	427	217	467	1961	1234	62.9	1926	0.47
1106-078	2560-2570	45	13	50	28	66	201	157	77.8	429	0.43
1106-081	2590-2600	38	26	150	80	202	496	457	92.3	1223	0.39
1106-084	2620-2630	2686	559	1442	538	912	6136	3451	56.2	1850	0.59
1106-087	2650-2660	2422	549	1395	500	897	5764	3342	58.0	1750	0.56
1106-090	2680-2690	1834	457	1131	504	841	4767	2933	61.5	1684	0.60
1106-093	2710-2720	1537	233	870	409	819	3868	2331	60.3	2299	0.50

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	iC ₄ nC ₄
1106-096	2740-2750	2295	183	361	133	232	3204	910	28.4	692	0.57
1106-099	2770-2780	2559	425	934	321	554	4792	2233	46.6	1167	0.58
1106-102	2800-2810	2925	734	1440	474	690	6264	3340	53.3	1042	0.69
1106-105	2830-2840	247	23	42	15	20	347	100	28.7	66	0.74
1106-108	2860-2870	1204	156	277	122	199	1958	754	38.5	474	0.61
1106-111	2890-2900	2583	481	609	156	249	4079	1496	36.7	546	0.63
1106-114	2920-2930	30	15	55	21	40	160	130	81.1	328	0.52
1106-117	2950-2960	58	22	49	14	24	167	110	65.6	212	0.59
1106-120	2980-2990	45	35	101	37	71	288	244	84.5	550	0.53
1106-123	3010-3020	1173	244	446	136	267	2267	1093	48.2	1398	0.51
1106-125	3040-3050	1528	487	781	167	242	3205	1678	52.3	746	0.69
1106-128	3070-3080	656	182	384	95	161	1478	821	55.6	519	0.59
1106-131	3100-3110	1833	526	1250	330	663	4601	2768	60.2	1642	0.50
1106-134	3120-3130	2025	673	1790	544	1163	6195	4170	67.3	3005	0.47
1106-137	3160-3170	921	313	887	301	591	3012	2091	69.4	1460	0.51
1106-140	3190-3200	1306	386	979	286	670	3627	2321	64.0	2012	0.43
1106-143	3220-3230	19	13	20	7	15	72	54	74.2	157	0.44
1106-146	3250-3260	898	214	310	76	140	1638	740	45.2	500	0.55
1106-149	3280-3290	1372	427	852	224	533	3409	2036	59.7	2847	0.42
1106-152	3310-3320	1100	324	627	185	412	2647	1547	58.4	2445	0.45
1106-155	3340-3350	153	70	115	30	59	427	274	64.2	300	0.51
1106-158	3370-3380	1978	485	815	231	522	4032	2054	50.9	2915	0.44
1106-161	3400-3410	25	6	12	4	8	55	30	54.8	330	0.47
1106-164	3430-3440	974	330	361	90	159	1914	940	49.1	1103	0.57
1106-167	3460-3470	98	67	79	17	38	298	201	67.3	341	0.45
1106-170	3490-3500	22	10	13	2	3	50	27	54.9	208	0.59
1106-173	3520-3530	1094	322	256	40	109	1820	726	39.9	504	0.37
1106-176	3550-3560	1084	397	339	92	213	2125	1042	49.0	2533	0.43
1106-178	3570-3590	36	11	8	2	3	60	24	40.4	57	0.64
1106-181	3610-3620	71	51	76	9	22	228	157	68.8	395	0.40

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1106-184	3640-3650	750	208	119	28	37	1141	391	34.3	451	0.76
1106-187	3670-3680	1455	617	461	34	181	2749	1294	47.1	342	0.19
1106-190	3700-3710	48	47	90	19	90	293	246	83.8	819	0.21
1106-191	3710-3720	2842	1150	1453	337	1282	7065	4223	59.8	5478	0.26
1106-192	3720-3730	716	562	699	127	539	2643	1927	72.9	1907	0.24
1106-193	3730-3740	293	269	516	99	485	1662	1370	82.4	2454	0.20
1106-194	3740-3750	435	414	752	114	660	2375	1940	81.7	3348	0.17
1106-195	3750-3760	458	176	187	33	133	986	528	53.5	498	0.25
1106-196	3760-3770	661	207	241	34	178	1322	661	50.0	783	0.19
1106-197	3770-3780	433	162	187	31	124	938	504	53.8	450	0.25
1106-198	3780-3790	188	60	69	12	41	371	183	49.2	141	0.29
1106-199	3790-3800	611	512	718	101	467	2410	1799	74.6	1229	0.22
1106-200	3800-3810	728	541	642	79	335	2324	1596	68.7	732	0.24
1106-201	3810-3820	3404	2087	2355	280	1090	9216	5813	63.1	2846	0.26
1106-202	3820-3830	3780	2159	3984	1303	2815	14041	10261	73.1	15010	0.46
1106-203	3830-3840	4053	4754	4249	574	1356	14985	10932	73.0	2649	0.42
1106-204	3840-3850	251	472	907	163	607	2400	2149	89.5	5150	0.27
1106-205	3850-3860	48	76	309	108	298	839	791	94.3	2077	0.36
1106-206	3860-3870	1113	481	696	175	457	2922	1809	61.9	2328	0.38
1106-207	3870-3880	1000	733	1014	218	665	3631	2630	72.4	5315	0.33
1106-208	3880-3890	1954	2951	3717	400	1712	10735	8781	81.8	6096	0.23
1106-209	3890-3900	333	760	1184	137	761	3175	2842	89.5	1672	0.18
1106-211	3910-3920	265	188	329	60	256	1098	833	75.9	3375	0.24
1106-212	3920-3930	499	360	323	34	101	1318	819	62.1	308	0.34
1106-213	3930-3940	631	331	254	31	67	1314	683	52.0	97	0.47
1106-214	3940-3950	5090	2305	1276	152	354	9176	4086	44.5	517	0.43
1106-215	3950-3960	232	94	56	9	22	414	181	43.8	107	0.40
1106-216	3960-3970	20834	4207	2400	436	1100	28977	8143	28.1	3751	0.40
1106-217	3970-3980	5416	2188	1907	349	824	10685	5269	49.3	1805	0.42
1106-218	3980-3990	2532	1474	1332	262	635	6235	3703	59.4	2850	0.41

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1106-219	3990-4000	8602	3451	2766	542	1272	16633	8031	48.3	5173	0.43
1106-220	4000-4010	3926	2072	1339	187	428	7952	4026	50.6	720	0.44
1106-221	4010-4020	282	254	373	64	190	1164	882	75.8	1529	0.34
1106-222	4020-4030	5560	1802	1261	184	460	9268	3708	40.0	1854	0.40
1106-223	4030-4040	754	322	397	79	265	1818	1063	58.5	848	0.30
1106-224	4040-4050	61	47	51	8	28	195	134	68.7	219	0.28
1106-225	4050-4060	2054	892	593	69	188	3796	1742	45.9	276	0.36
1106-226	4060-4070	4005	3978	6524	1009	3213	18728	14724	78.6	10241	0.31
1106-227	4070-4080	493	616	1332	270	934	3644	3151	86.5	2440	0.29
1106-228	4080-4090	66	142	465	109	398	1179	1114	94.4	1310	0.27
1106-229	4090-4100	1214	1117	1721	304	1095	5451	4238	77.7	3218	0.28
1106-230	4100-4110	378	458	969	192	718	2715	2337	86.1	3111	0.27
1106-231	4110-4120	805	558	1449	366	1655	4833	4028	83.4	10316	0.22
1106-232	4120-4130	1825	1113	2144	321	1386	6788	4964	73.1	9897	0.23
1106-233	4130-4140	268	81	102	24	159	634	367	57.8	2582	0.15
1106-234	4150-4160	2214	2381	3762	639	1957	10953	8739	79.8	9094	0.33
1106-235	4160-4170	34	22	44	9	35	145	110	76.3	339	0.26
1106-236	4170-4180	17032	5308	5851	1148	3114	32453	15421	47.5	19154	0.37
1106-237	4180-4190	49	186	391	67	191	884	835	94.5	2189	0.35
1106-238	4190-4200	61	62	477	53	223	877	816	93.0	2587	0.24
1106-239	4200-4210	727	754	1168	210	747	3607	2879	79.8	7684	0.28
1106-240	4210-4220	1083	941	1264	200	747	4235	3152	74.4	4603	0.27
1106-241	4220-4230	102	135	206	33	111	587	485	82.7	610	0.30
1106-242	4230-4240	171	257	507	90	273	1298	1128	86.8	2238	0.33
1106-243	4240-4250	3782	2147	1935	337	950	9151	5369	58.7	2496	0.35
1106-244	4250-4260	5643	2682	1962	260	755	11302	5659	50.1	3742	0.34
1106-245	4260-4270	2675	1824	1651	204	578	6932	4257	61.4	2243	0.35
1106-246	4270-4280	4231	2628	2414	303	830	10405	6174	59.3	2644	0.37
1106-247	4280-4290	3246	2654	1520	169	399	7988	4742	59.4	1898	0.42
1106-248	4290-4300	569	588	622	105	252	2137	1568	73.4	706	0.41

TABLE 2A
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ HYDROCARBONS IN AIR SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1106-249	4310-4320	10433	2855	1587	246	629	15750	5317	33.8	2068	0.39
1106-250	4310-4320	4382	1328	897	134	293	7034	2652	37.7	1042	0.46
1106-251	4320-4330	1719	1367	1514	212	593	5405	3686	68.2	3218	0.36
1106-252	4330-4340	1974	1261	1585	211	764	5795	3821	65.9	5702	0.28
1106-253	4340-4350	1566	1996	2848	246	1157	7814	6248	80.0	12781	0.21
1106-254	4350-4360	903	717	931	127	483	3161	2258	71.4	4469	0.26

TABLE 2B
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-002	1000-1050	2152	17	11	2	9	2191	39	1.8	259	0.26
1106-004	1100-1150	4313	16	5	1	1	4335	22	0.5	736	0.90
1106-006	1200-1250	3943	17	5	0	1	3965	22	0.6	700	0.63
1106-008	1300-1350	1891	10	3	2	6	1912	21	1.1	652	0.34
1106-010	1400-1450	1083	18	3	1	1	1105	22	2.0	544	0.99
1106-012	1500-1550	4437	23	8	0	1	4469	32	0.7	551	0.20
1106-014	1600-1650	1838	14	6	2	1	1862	24	1.3	276	1.77
1106-016	1700-1750	2691	25	8	5	2	2730	40	1.5	201	2.06
1106-018	1800-1850	4802	34	16	18	6	4876	74	1.5	206	3.29
1106-020	1900-1950	3763	25	18	19	4	3829	66	1.7	176	4.25
1106-022	2000-2010	3231	21	13	13	5	3284	52	1.6	126	2.65
1106-032	2100-2110	717	8	6	4	2	736	19	2.6	135	2.45
1106-042	2200-2210	1153	18	5	3	1	1181	27	2.3	88	1.91
1106-045	2230-2240	806	19	9	4	3	842	36	4.3	264	1.08
1106-048	2260-2270	180	18	13	5	10	225	45	20.2	199	0.47
1106-051	2290-3000	242	10	5	2	3	262	20	7.6	106	0.72
1106-054	2320-2330	1140	36	34	11	22	1242	102	8.2	119	0.50
1106-057	2350-2360	571	26	36	12	29	675	104	15.3	101	0.43
1106-060	2380-2390	313	17	25	10	25	390	77	19.8	107	0.39
1106-063	2410-2420	721	48	92	34	98	993	273	27.5	187	0.35
1106-066	2440-2450	341	30	70	28	90	560	219	39.2	286	0.31
1106-069	2470-2480	351	30	88	47	147	663	312	47.1	771	0.32
1106-072	2500-2510	138	18	45	122	425	748	610	81.6	15483	0.29
1106-075	2530-2540	364	59	290	227	757	1697	1333	78.6	10971	0.30
1106-078	2560-2570	101	18	100	86	308	613	512	83.6	5283	0.28
1106-081	2590-2600	96	12	64	63	253	488	392	80.2	3736	0.25
1106-084	2620-2630	826	169	728	332	904	2959	2133	72.1	4454	0.37
1106-087	2650-2660	309	73	282	153	442	1258	949	75.5	7521	0.35
1106-090	2680-2690	762	142	613	345	873	2734	1973	72.1	6212	0.40
1106-093	2710-2720	107	38	79	53	190	467	360	77.0	6136	0.28

TABLE 2B
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-096	2740-2750	243	54	139	81	210	727	485	66.6	1462	0.39
1106-099	2770-2780	235	45	143	62	190	676	441	65.3	1636	0.33
1106-102	2800-2810	604	111	415	160	427	1718	1114	64.8	1500	0.38
1106-105	2830-2840	341	58	129	46	128	702	361	51.4	932	0.36
1106-108	2860-2870	692	106	258	132	430	1617	926	57.2	2649	0.31
1106-111	2890-2900	748	219	725	280	698	2671	1922	72.0	2299	0.40
1106-114	2920-2930	29	11	45	25	77	187	158	84.7	839	0.32
1106-117	2950-2960	135	84	292	98	238	848	713	84.1	1071	0.41
1106-120	2980-2990	11	5	9	3	10	37	26	70.6	94	0.24
1106-123	3010-3020	35	9	34	20	82	180	145	80.7	997	0.25
1106-125	3040-3050	54	23	122	41	127	367	313	85.2	629	0.33
1106-128	3070-3080	101	60	370	95	339	966	864	89.5	969	0.28
1106-131	3100-3110	69	33	234	86	342	764	695	90.9	1269	0.25
1106-134	3120-3130	8	2	11	5	22	46	38	83.4	154	0.21
1106-137	3160-3170	206	64	198	159	578	1205	999	82.9	4477	0.27
1106-140	3190-3200	208	51	167	69	304	799	591	74.0	2141	0.23
1106-143	3220-3230	580	112	164	66	267	1189	609	51.2	1455	0.25
1106-146	3250-3260	271	77	195	59	206	807	536	66.4	1048	0.28
1106-149	3280-3290	255	46	52	24	116	492	237	48.1	1098	0.20
1106-152	3310-3320	249	37	41	20	84	431	182	42.2	901	0.23
1106-155	3340-3350	364	107	330	79	240	1121	756	67.5	828	0.33
1106-158	3370-3380	199	27	41	16	73	357	158	44.1	869	0.21
1106-161	3400-3410	107	27	173	64	147	518	412	79.4	567	0.43
1106-164	3430-3440	232	37	86	27	85	467	235	50.4	600	0.32
1106-167	3460-3470	954	114	99	16	60	1243	289	23.3	323	0.27
1106-170	3490-3500	548	75	89	20	62	794	246	31.0	424	0.32
1106-173	3520-3530	1420	151	116	19	79	1786	366	20.5	410	0.24
1106-176	3550-3560	466	75	134	41	127	844	378	44.8	2465	0.32
1106-178	3570-3590	616	191	180	37	110	1133	517	45.6	618	0.34
1106-181	3610-3620	120	28	56	11	44	259	138	53.5	221	0.25

TABLE 2B
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-184	3640-3650	140	34	37	8	17	236	96	40.6	190	0.50
1106-187	3670-3680	378	419	758	49	371	1974	1597	80.9	234	0.13
1106-190	3700-3710	193	135	311	54	299	992	799	80.6	1773	0.18
1106-191	3710-3720	169	356	1007	333	1430	3295	3126	94.9	6830	0.23
1106-192	3720-3730	475	263	831	249	1257	3074	2599	84.5	5504	0.20
1106-193	3730-3740	914	168	390	107	763	2342	1428	61.0	3421	0.14
1106-194	3740-3750	1492	263	581	140	1035	3511	2019	57.5	3701	0.13
1106-195	3750-3760	2287	699	778	120	826	4710	2424	51.5	3672	0.15
1106-196	3760-3770	1224	348	412	50	324	2358	1133	48.1	1505	0.15
1106-197	3770-3780	1352	382	503	77	460	2775	1423	51.3	1630	0.17
1106-198	3780-3790	1933	532	727	106	691	3989	2056	51.6	1546	0.15
1106-199	3790-3800	2464	624	1296	169	1236	5790	3325	57.4	1595	0.14
1106-200	3800-3810	3853	1616	2657	257	1739	10121	6268	61.9	1505	0.15
1106-201	3810-3820	3128	404	849	124	764	5269	2142	40.6	1468	0.16
1106-202	3820-3830	483	488	1770	658	2499	5899	5416	91.8	14729	0.26
1106-203	3830-3840	532	1157	2022	262	968	4941	4409	89.2	2279	0.27
1106-204	3840-3850	70	12	37	7	45	171	101	59.1	763	0.16
1106-205	3850-3860	490	79	439	225	666	1899	1409	74.2	1769	0.34
1106-206	3860-3870	844	91	95	26	101	1158	314	27.1	1715	0.26
1106-207	3870-3880	734	69	63	16	64	947	213	22.5	1266	0.25
1106-208	3880-3890	665	82	189	57	209	1201	536	44.7	1962	0.27
1106-209	3890-3900	182	18	21	5	24	249	68	27.1	839	0.20
1106-211	3910-3920	364	17	15	3	18	415	52	12.4	828	0.17
1106-212	3920-3930	803	94	184	30	131	1242	439	35.3	864	0.23
1106-213	3930-3940	658	278	345	37	157	1475	817	55.4	476	0.24
1106-214	3940-3950	5368	3209	1261	126	531	10495	5127	48.9	1095	0.24
1106-215	3950-3960	743	798	1061	224	820	3646	2903	79.6	2585	0.27
1106-216	3960-3970	443	425	293	67	283	1511	1068	70.7	1848	0.23
1106-217	3970-3980	357	195	322	106	334	1313	956	72.8	1288	0.32
1106-218	3980-3990	182	63	193	46	198	682	500	73.3	2500	0.23

TABLE 2B
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-219	3990-4000	457	184	398	115	418	1573	1115	70.9	2079	0.28
1106-220	4000-4010	1258	1016	862	127	404	3666	2409	65.7	1172	0.31
1106-221	4010-4020	175	133	475	76	339	1199	1024	85.4	1203	0.22
1106-222	4020-4030	267	189	318	50	232	1056	789	74.7	1362	0.21
1106-223	4030-4040	440	63	90	24	136	753	313	41.6	1185	0.18
1106-224	4040-4050	148	306	718	74	334	1581	1432	90.6	746	0.22
1106-225	4050-4060	503	404	508	61	255	1730	1228	71.0	519	0.24
1106-226	4060-4070	340	73	219	48	234	915	575	62.8	1119	0.20
1106-227	4070-4080	142	72	349	97	493	1153	1011	87.7	1505	0.20
1106-228	4080-4090	128	48	348	113	604	1241	1113	89.7	1873	0.19
1106-229	4090-4100	101	107	355	78	395	1035	934	90.2	1564	0.20
1106-230	4100-4110	69	63	298	100	517	1048	979	93.5	2695	0.19
1106-231	4110-4120	160	48	113	56	333	711	551	77.6	2145	0.17
1106-232	4120-4130	417	81	90	21	145	755	338	44.8	1578	0.15
1106-233	4130-4140	186	94	72	12	80	446	259	58.2	1061	0.15
1106-234	4150-4160	417	101	147	35	158	859	442	51.4	1428	0.22
1106-235	4160-4170	162	67	245	63	337	874	713	81.5	1181	0.19
1106-236	4170-4180	392	46	55	10	53	556	164	29.5	1298	0.19
1106-237	4180-4190	322	59	156	38	143	717	396	55.2	1952	0.27
1106-238	4190-4200	301	26	54	14	82	477	175	36.8	1415	0.17
1106-239	4200-4210	266	49	76	15	92	498	232	46.7	1069	0.16
1106-240	4210-4220	251	52	97	19	105	525	274	52.2	931	0.18
1106-241	4220-4230	322	42	127	22	112	625	304	48.6	1184	0.20
1106-242	4230-4240	760	327	228	30	156	1501	741	49.4	1811	0.19
1106-243	4240-4250	734	191	254	62	211	1452	719	49.5	884	0.30
1106-244	4250-4260	840	282	399	85	300	1906	1066	55.9	1531	0.28
1106-245	4260-4270	602	457	713	125	432	2330	1728	74.2	1463	0.29
1106-246	4270-4280	302	149	259	44	205	959	657	68.5	1147	0.22
1106-247	4280-4290	459	483	566	77	263	1848	1389	75.2	1259	0.29
1106-248	4290-4300	321	268	422	68	244	1323	1002	75.7	902	0.28

TABLE 2B
CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-249	4310-4320	883	358	553	101	382	2276	1393	61.2	1522	0.26
1106-250	4310-4320	617	330	574	90	351	1961	1345	68.5	1535	0.26
1106-251	4320-4330	441	99	278	56	237	1111	670	60.3	1268	0.24
1106-252	4330-4340	252	70	56	9	51	439	187	42.6	673	0.18
1106-253	4340-4350	194	25	28	5	26	277	83	30.1	578	0.18
1106-254	4350-4360	269	24	29	6	30	358	89	24.8	594	0.19

TABLE 2 C
TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-002	1000-1050	3624	28	36	10	31	3729	105	2.8	412	0.32
1106-004	1100-1150	5266	24	6	1	2	5299	33	0.6	817	0.68
1106-006	1200-1250	4789	20	5	1	1	4816	27	0.6	767	0.56
1106-008	1300-1350	2961	17	4	2	6	2991	29	1.0	722	0.34
1106-010	1400-1450	2432	35	5	1	1	2475	43	1.7	642	1.09
1106-012	1500-1550	5163	25	8	1	1	5198	35	0.7	576	0.44
1106-014	1600-1650	4609	25	10	4	3	4650	41	0.9	373	1.55
1106-016	1700-1750	3895	58	17	11	4	3985	90	2.2	233	2.88
1106-018	1800-1850	6195	66	28	28	9	6327	132	2.1	238	3.06
1106-020	1900-1950	5385	61	32	30	6	5514	130	2.3	198	5.20
1106-022	2000-2010	4931	42	22	20	6	5022	90	1.8	151	3.13
1106-032	2100-2110	2105	18	11	6	2	2141	37	1.7	166	3.05
1106-042	2200-2210	2428	51	14	6	3	2502	74	2.9	107	2.12
1106-045	2230-2240	5034	83	26	8	5	5156	122	2.4	361	1.63
1106-048	2260-2270	12703	648	336	67	76	13832	1128	8.2	777	0.88
1106-051	2290-3000	1538	38	19	5	6	1607	69	4.3	147	0.75
1106-054	2320-2330	2226	70	58	17	31	2402	176	7.3	147	0.54
1106-057	2350-2360	3855	208	173	45	75	4356	501	11.5	162	0.60
1106-060	2380-2390	1381	54	66	22	52	1575	194	12.3	232	0.43
1106-063	2410-2420	2818	214	297	90	198	3616	798	22.1	266	0.45
1106-066	2440-2450	2814	217	333	96	224	3685	871	23.6	428	0.43
1106-069	2470-2480	2528	106	194	79	218	3124	596	19.1	990	0.36
1106-072	2500-2510	157	25	53	134	461	830	672	81.0	16771	0.29
1106-075	2530-2540	1091	181	717	444	1224	3658	2567	70.2	12897	0.36
1106-078	2560-2570	146	31	150	114	374	814	669	82.1	5712	0.31
1106-081	2590-2600	135	37	214	143	455	984	849	86.3	4959	0.31
1106-084	2620-2630	3511	729	2170	870	1816	9096	5584	61.4	6305	0.48
1106-087	2650-2660	2731	622	1677	653	1339	7022	4291	61.1	9271	0.49
1106-090	2680-2690	2595	599	1744	849	1714	7501	4906	65.4	7896	0.50
1106-093	2710-2720	1644	271	949	462	1009	4335	2691	62.1	8435	0.46

TABLE 2 C
TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-096	2740-2750	2537	238	500	214	442	3931	1394	35.5	2154	0.48
1106-099	2770-2780	2794	470	1077	384	744	5468	2675	48.9	2803	0.52
1106-102	2800-2810	3529	846	1856	635	1117	7982	4453	55.8	2542	0.57
1106-105	2830-2840	589	80	172	61	147	1049	460	43.9	998	0.41
1106-108	2860-2870	1896	262	535	254	628	3576	1680	47.0	3123	0.40
1106-111	2890-2900	3332	700	1334	436	947	6749	3418	50.6	2845	0.46
1106-114	2920-2930	59	26	100	46	117	347	288	83.0	1166	0.39
1106-117	2950-2960	192	107	341	112	262	1015	822	81.0	1283	0.43
1106-120	2980-2990	56	39	109	40	81	325	270	82.9	645	0.49
1106-123	3010-3020	1208	253	481	156	349	2447	1239	50.6	2394	0.45
1106-125	3040-3050	1582	510	903	209	369	3573	1991	55.7	1374	0.57
1106-128	3070-3080	758	243	754	189	499	2443	1685	69.0	1488	0.38
1106-131	3100-3110	1903	559	1484	416	1004	5365	3463	64.5	2911	0.41
1106-134	3120-3130	2033	675	1800	548	1184	6241	4208	67.4	3158	0.46
1106-137	3160-3170	1127	376	1085	459	1170	4218	3090	73.3	5937	0.39
1106-140	3190-3200	1514	438	1146	355	974	4426	2912	65.8	4152	0.36
1106-143	3220-3230	598	124	184	73	282	1261	663	52.6	1612	0.26
1106-146	3250-3260	1170	291	504	135	346	2446	1276	52.2	1548	0.39
1106-149	3280-3290	1628	473	903	248	649	3901	2273	58.3	3945	0.38
1106-152	3310-3320	1349	361	668	204	496	3078	1729	56.2	3345	0.41
1106-155	3340-3350	518	177	445	110	299	1548	1031	66.6	1127	0.37
1106-158	3370-3380	2177	512	857	247	595	4389	2211	50.4	3784	0.41
1106-161	3400-3410	131	33	185	68	156	573	442	77.1	898	0.43
1106-164	3430-3440	1205	367	447	117	244	2380	1175	49.4	1703	0.48
1106-167	3460-3470	1051	181	178	33	98	1541	490	31.8	663	0.34
1106-170	3490-3500	571	85	101	22	65	844	274	32.4	632	0.34
1106-173	3520-3530	2514	473	372	59	188	3606	1092	30.3	914	0.32
1106-176	3550-3560	1549	472	473	134	341	2969	1419	47.8	4999	0.39
1106-178	3570-3590	652	202	188	39	113	1193	541	45.4	675	0.35
1106-181	3610-3620	191	79	131	20	65	486	295	60.6	616	0.30

TABLE 2 C
TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-184	3640-3650	890	241	156	37	53	1377	487	35.4	641	0.68
1106-187	3670-3680	1833	1036	1219	83	552	4723	2891	61.2	576	0.15
1106-190	3700-3710	240	182	400	73	389	1285	1044	81.3	2592	0.19
1106-191	3710-3720	3011	1506	2460	670	2712	10360	7349	70.9	12308	0.25
1106-192	3720-3730	1191	825	1530	376	1795	5717	4526	79.2	7411	0.21
1106-193	3730-3740	1206	437	907	207	1248	4004	2798	69.9	5875	0.17
1106-194	3740-3750	1928	677	1333	254	1695	5886	3959	67.3	7049	0.15
1106-195	3750-3760	2745	876	965	153	958	5696	2952	51.8	4170	0.16
1106-196	3760-3770	1886	555	653	84	502	3680	1794	48.8	2288	0.17
1106-197	3770-3780	1786	544	690	109	584	3713	1927	51.9	2079	0.19
1106-198	3780-3790	2121	592	796	118	732	4360	2239	51.4	1687	0.16
1106-199	3790-3800	3076	1136	2014	271	1704	8200	5124	62.5	2823	0.16
1106-200	3800-3810	4581	2156	3298	336	2074	12445	7865	63.2	2237	0.16
1106-201	3810-3820	6531	2491	3205	404	1854	14486	7955	54.9	4315	0.22
1106-202	3820-3830	4263	2647	5754	1961	5314	19940	15676	78.6	29740	0.37
1106-203	3830-3840	4585	5911	6271	836	2323	19926	15341	77.0	4927	0.36
1106-204	3840-3850	321	484	943	171	652	2571	2250	87.5	5913	0.26
1106-205	3850-3860	538	155	748	332	964	2738	2200	80.3	3846	0.34
1106-206	3860-3870	1957	572	791	201	559	4080	2123	52.0	4043	0.36
1106-207	3870-3880	1735	802	1078	234	729	4578	2843	62.1	6580	0.32
1106-208	3880-3890	2619	3034	3906	456	1921	11935	9317	78.1	8058	0.24
1106-209	3890-3900	515	778	1204	142	785	3425	2909	85.0	2511	0.18
1106-211	3910-3920	629	204	343	63	274	1513	885	58.5	4203	0.23
1106-212	3920-3930	1303	454	508	64	232	2560	1258	49.1	1173	0.28
1106-213	3930-3940	1289	609	598	69	224	2790	1501	53.8	573	0.31
1106-214	3940-3950	10458	5514	2537	278	884	19672	9213	46.8	1612	0.31
1106-215	3950-3960	976	891	1118	233	842	4060	3084	76.0	2693	0.28
1106-216	3960-3970	21277	4632	2693	502	1384	30488	9211	30.2	5599	0.36
1106-217	3970-3980	5773	2383	2229	455	1158	11998	6226	51.9	3093	0.39
1106-218	3980-3990	2714	1537	1525	308	833	6916	4203	60.8	5350	0.37

TABLE 2 C
TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-219	3990-4000	9059	3635	3164	658	1690	18206	9147	50.2	7252	0.39
1106-220	4000-4010	5183	3089	2200	314	832	11618	6435	55.4	1892	0.38
1106-221	4010-4020	457	388	848	140	529	2363	1906	80.7	2732	0.27
1106-222	4020-4030	5828	1991	1578	234	693	10324	4496	43.6	3216	0.34
1106-223	4030-4040	1194	385	488	103	401	2571	1376	53.5	2033	0.26
1106-224	4040-4050	209	354	770	82	361	1776	1567	88.2	965	0.23
1106-225	4050-4060	2557	1295	1102	129	444	5527	2970	53.7	795	0.29
1106-226	4060-4070	4344	4051	6743	1057	3447	19643	15298	77.9	11360	0.31
1106-227	4070-4080	635	687	1681	367	1427	4797	4162	86.8	3945	0.26
1106-228	4080-4090	193	190	813	222	1001	2420	2227	92.0	3183	0.22
1106-229	4090-4100	1315	1224	2076	382	1489	6487	5171	79.7	4782	0.26
1106-230	4100-4110	446	522	1267	292	1236	3763	3317	88.1	5805	0.24
1106-231	4110-4120	964	607	1562	423	1988	5544	4579	82.6	12461	0.21
1106-232	4120-4130	2242	1195	2234	342	1531	7543	5302	70.3	11475	0.22
1106-233	4130-4140	454	176	174	36	240	1080	626	58.0	3643	0.15
1106-234	4150-4160	2632	2482	3909	674	2115	11812	9180	77.7	10522	0.32
1106-235	4160-4170	196	88	290	73	373	1019	823	80.8	1520	0.19
1106-236	4170-4180	17424	5354	5906	1158	3167	33009	15585	47.2	20452	0.37
1106-237	4180-4190	370	245	547	105	334	1602	1231	76.9	4141	0.31
1106-238	4190-4200	362	88	532	67	305	1354	991	73.2	4003	0.22
1106-239	4200-4210	993	804	1245	225	838	4105	3112	75.8	8753	0.27
1106-240	4210-4220	1334	993	1361	219	852	4759	3425	72.0	5534	0.26
1106-241	4220-4230	423	177	333	55	224	1212	789	65.1	1794	0.25
1106-242	4230-4240	931	585	735	120	429	2799	1869	66.8	4049	0.28
1106-243	4240-4250	4516	2338	2189	399	1162	10604	6088	57.4	3380	0.34
1106-244	4250-4260	6482	2964	2361	344	1056	13207	6725	50.9	5273	0.33
1106-245	4260-4270	3277	2281	2364	329	1010	9262	5984	64.6	3706	0.33
1106-246	4270-4280	4533	2778	2672	347	1035	11364	6831	60.1	3791	0.34
1106-247	4280-4290	3705	3137	2087	246	662	9837	6132	62.3	3157	0.37
1106-248	4290-4300	890	856	1044	173	496	3459	2570	74.3	1608	0.35

TABLE 2 C
TOTAL CONCENTRATION (VOL. PPM OF ROCK) OF C₁ - C₇ 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	$\frac{iC_4}{nC_4}$
1106-249	4310-4320	11316	3213	2139	347	1011	18026	6710	37.2	3590	0.34
1106-250	4310-4320	4999	1658	1471	224	644	8996	3997	44.4	2577	0.35
1106-251	4320-4330	2160	1467	1792	268	829	6516	4356	66.9	4487	0.32
1106-252	4330-4340	2226	1331	1642	220	815	6233	4008	64.3	6375	0.27
1106-253	4340-4350	1760	2021	2876	251	1182	8091	6331	78.3	13359	0.21
1106-254	4350-4360	1173	741	960	133	514	3520	2347	66.7	5063	0.26

TABLE 3
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
1106-004A	1100-1150m	W;H-I;Al-Am		45	F-M/C	F-G	1+	
1106-008A	1300-1350m	W;H-I;Al-Am		30	F-M/C	F-G	1+	
1106-012A	1500-1550m	W;H-I;Al-Am		35	F-M/C	F-G	1+	
1106-014A	1600-1650m	W;I-H;Al-Am		45	F-C	F-G	1+	
1106-016A	1700-1750m	W;I-H;Al-Am		50	F-M/C	F	1+	
1106-020A	1900-1950m	-;W-Am**-Al**-H**;I	differentiation difficult **includes material passing to amorphous	10	F-M	F-G	1+ to 2-	
1106-022A	2000-2010m	-;W-Am-H-Al;I		20	F-C	F	1+/1+ to 2-	
1106-032A	2100-2110m	-;W-Al-H-I;Am	fairly lean	25	F-C	F	1+ to 2-	
1106-042A	2200-2210m	-;Al-H-W-I;Am	differentiation difficult	30	F-M	F	1+ to 2-	
1106-255A	2285.0m SWC	W-I;H;Al	contamination dominant H marginally mature	85	F-M	P-F	1+ to 2-(?)	
1106-256A	2330.0m SWC	I-W;H;Al-Am	contamination dominant H at 2- to 2	80	F-C	P-F	1+ to 2-(?)	
1106-257A	2340.0m SWC	I-W;-;H-Al-Am	trace of H at 1+ to 2-, material at 2- to 2 and 2	85	F-M	P-F	2- max	
1106-258A	2400.0m SWC	I-W;-;Al-H	H dominantly at 2- to 2+ and greater	90	F-M	P	1+ to 2-/2-	
1106-259A	2494.9m SWC	W-I;Al-H;-	H at 2- to 2. Close to 2-	65	F-C	G	1+ to 2-/2-	
1106-260A	2550.0m SWC	W-I;Al-H;-	close to 2-	65	F-C	F	1+ to 2-/2-	
1106-261A	2600.0m SWC	W-I;Al-H;-	disseminated amorphous-like material believed to be contamination	65	F-M	F	1+ to 2-/2-	
1106-090A	2680-2690m	W-I;H-Al;-		45	F-M	F	1+ to 2-/2- (max)	
1106-262A	2700.0m SWC	W-I;H-Al;Am	H at 2- and 2- to 2	70	F-M	F	1+ to 2-/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 3
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
1106-263A	2800.0m SWC	I-W;H;Al	disseminated contamination H at 2- to 2	80	F-M	F	2-	
1106-105A	2830-2840m	W-I;-;H-Al		80	F-C	F	2-	
1106-111A	2890-2900m	W-I;-;H-Al	H at 1+ to 2- - caving(?)	80	F-M	F-G	2-(?)	
1106-117A	2950-2960m	W-I;-;H-Al		80	F-M	F	2-(??)	
1106-123A	3010-3020m	W;I;H-Al	**resembles coal/lignite - possibly additive		F-C	G	**	
1106-128A	3070-3080m	W;I;H-Al	**as 128A		F-C	F-G	**	
1106-264A	3150.0m SWC	I-W;-;H-Al	H at 2- to 2	85	F-M	F-G	2-	
1106-137A	3160-3170m	W;I;H-Al	H at 1+ resembles coal/lignite very dominantly		F-C	F	2- to 2(?)	
1106-265A	3163.0m SWC	I-W;-;H-Al		80	F-M	F	2- to 2	
1106-140A	3190-3200m	W-I;H;Al		60	F-M	F	1+ to 2-/2- to 2	
1106-266A	3208.0m SWC	W-I;H;Al	H at 2. Close to 2	75	F-M	F-G	2- to 2	
1106-146A	3250-3260m	W-I;-;H-Al	frequent lignite/coal	80	F-C	F-G	1+ to 2-/2- to 2	
1106-152A	3310-3320m	W-I;-;H-Al	presence of lignite suspected	50	F-C	F-G	2- to 2(?)	
1106-158A	3370-3380m	W;I;H-Al	**sample consists largely of lignite	75	F-C	G	**1+ to 2-	
1106-164A	3430-3440m	W;I;H-Al	frequent lignite. H at 1+	40	F-C	F-G	2- to 2	
1106-167A	3460-3470m	W-I;H-Al	resembles lignite	55	F-C	F-G	1+ to 2-	
1106-173A	3520-3530m	W;I;H-Al	abundant material resembling lignite, caving also suspected	50	F-C	G	2(??)	
1106-181A	3610-3630m	I-W;-;H-Al	**H variable between 1+ (lignite) and 2	80	F-C	F-G	**	
1106-187B	3670-3680m	I-W;-;H-Al	**as 181A	85	F-M	F	**	

Algal, Amorphous, Herbaceous, Inertinite, Resin, Wood

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

Dominant, Major, Significant, Minor

TABLE 3
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
1106-269A	3710.0m SWC	I-W;-;Al-H-Am	contamination	80	F-M	P-F	2- to 2	
1106-270A	3712.0m SWC	Am;-;W-I-Al-H		15	F-VC	F-G	2- to 2/2	
1106-273A	3718.0m SWC	-;Al**-Am**-I-W;H	differentiation difficult, frequently observed by pyrite **includes material passing to amorphous	30	F-C	F	2(?)	
1106-275A	3722.0m SWC	-;W-H-I-Al;Am		45	M	G	2 max	
1106-277A	3745.0m SWC	Am;W;Al-I-H	H at 2	15	F-C	F	2 max	
1106-282A	3818.0m SWC	W;I-H;Al-Am		50	F-C	G	2	
1106-293A	3921.99-3922.0m CORE	W;I-H;Al-Am		55	M-C	G	2	
1106-221A	4010-4020m	W;I-H;Al-Am		60	F-C	G	2	
1106-285A	4066.0m SWC	W-I;H;Al-Am		70	F-C	G	2	
1106-297A	4116.00-4116.05m CORE	-;W-H-I;Al-Am		40	F-M/C	F	2 to 2+ max	
1106-303A	4142.0-4142.03m CORE	-;W-H-I-Al;Am	differentiation difficult	35	F-C	F-G	2 to 2+ max	
1106-306A	4210.50-4210.55m CORE	-;W-H-I;Al-Am		40	F-C	F-G	2 to 2+	
1106-289A	4293.1m SWC	W;I-H;Al-Am		50	F-C	G	2 to 2+	
1106-291A	4335.0m SWC	I-W;-;H-Al		80	F-C	G	2 to 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 4
VITRINITE REFLECTANCE DATA

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY R _o (%), (NUMBER OF PARTICLES)			REMARKS
			1	2	3	
1106-004A	1100-1150m	WR	0.32 (4)	-	-	
1106-008B	1300-1350m	WR	0.34 (2)	0.72 (1)	-	
1106-012A	1500-1550m	WR	0.33 (3)	0.93 (2)	-	
1106-014A	1600-1650m	WR	0.73 (3)	-	-	
1106-016A	1700-1750m	WR	0.30 (1)	0.64 (1)	-	
1106-018A	1800-1850m	WR	0.35 (2)	0.86 (3)	-	
1106-020A	1900-1950m	WR	0.37 (6)	-	-	
1106-022A	2000-2010m	WR	0.39 (1)	0.89 (2)	1.53 (1)	
1106-032A	2100-2110m	WR	NO DETERMINATIONS POSSIBLE			
1106-042A	2200-2210m	WR	0.86 (2)	-	-	
1106-255A	2285.0m SWC	WR	1.05 (3)	-	-	
1106-256A	2330.0m SWC	WR	0.44 (5)	1.00 (7)	-	
1106-257A	2340.0m SWC	WR	0.49 (1)	0.97 (8)	-	
1106-258A	2400.0m SWC	WR	0.47 (3)	1.13 (11)	-	
1106-259A	2494.9m SWC	WR	0.46 (5)	1.01 (10)	-	
1106-260A	2550.0m SWC	WR	0.47 (5)	1.00 (1)	-	
1106-261A	2600.0m SWC	WR	0.47 (7)	0.96 (9)	-	
1106-090A	2680-2690m	WR	0.43 (6)	0.85 (9)	-	
1106-262A	2700.0m SWC	WR	0.48 (8)	0.97 (8)	-	
1106-263A	2800.0m SWC	WR	0.46 (2)	1.03 (13)	-	
1106-105A	2830-2840m	WR	0.42 (6)	0.99 (12)	-	
1106-111A	2890-2900m	WR	0.42 (4)	0.93 (11)	-	
1106-117A	2950-2960m	WR	0.45 (3)	0.89 (11)	-	
1106-123A	3010-3020m	WR	0.86 (10)	-	-	
1106-128A	3070-3080m	WR	0.97 (14)	-	-	
1106-264A	3150.0m SWC	WR	0.47 (2)	1.05 (13)	-	
1106-137A	3160-3170m	WR	0.44 (6)	0.88 (8)	-	
1106-265A	3163.0m SWC	WR	0.48 (3)	1.02 (11)	-	
1106-140A	3190-3200m	WR	0.47 (7)	1.05 (4)	-	
1106-266A	3208.0m SWC	WR	0.51 (4)	1.01 (9)	-	
1106-146A	3250-3260m	WR	0.48 (2)	0.95 (8)	-	
1106-152A	3310-3320m	WR	0.48 (2)	0.94 (10)	-	
1106-158A	3370-3380m	WR	0.47 (3)	1.07 (11)	-	
1106-164A	3430-3440m	WR	0.48 (4)	1.07 (11)	-	
1106-167A	3460-3470m	WR	0.49 (4)	1.02 (9)	-	
1106-173A	3520-3530m	WR	0.47 (3)	1.09 (11)	-	
1106-181A	3610-3630m	WR	1.18 (13)	-	-	

GT—ditch cuttings; CO—core; WR—whole rock; KC—kerogen concentrate.

Colours — spore fluorescence.

*Reworked

TABLE 4
VITRINITE REFLECTANCE DATA

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY Ro (%), (NUMBER OF PARTICLES)			REMARKS
			1	2	3	
1106-187B	3670-3680m	WR	1.42 (2)	-	-	
1106-267A	3706.0m SWC	WR	NO DETERMINATIONS POSSIBLE			
1106-269A	3710.0m SWC	WR	0.5184)	1.40 (7)	-	
1106-270A	3712.0m SWC	WR	0.50 (19)	-	-	
1106-273A	3718.0m SWC	WR	0.52 (3)	0.97 (7)	-	
1106-195A	3750-3760m	WR	0.52 (2)	1.26 (9)	-	
1106-278A	3764.9m SWC	WR	0.54 (5)	1.09 (9)	-	
1106-282A	3818.0m SWC	WR	0.61 (10)	0.88 (11)	-	
1106-283A	3822.0m SWC	WR	0.53 (5)	1.14 (4)	-	
1106-293A	3921.99-3922.0m CORE	WR	0.60 (15)	0.98 (8)	-	
1106-214C	3940-3950m	WR	0.79 (34)	-	-	
1106-221A	4010-4020m	KC	0.66 (13)	0.97 (6)	-	
1106-284A	4933.5m SWC	WR	1.14 (7)	-	-	
1106-285A	4066.0m SWC	WR	0.70 (11)	0.95 (4)	-	
1106-288A	4096.5m SWC	WR	0.53 (16)	1.10 (5)	-	
1106-297A	4116.00-4116.05m CORE	WR	0.52 (11)	1.02 (5)	-	
1106-303A	4142.0-4142.03m CORE	WR	0.50 (15)	1.03 (4)	-	
1106-306A	4210.50-4210.55m CORE	WR	0.61 (16)	0.91 (4)	-	
1106-245B	4260-4270m	KC	0.63 (8)	0.99 (4)	-	
1106-289A	4293.1m SWC	WR	0.58 (33)	-	-	
1106-291A	4335.0m SWC	WR	0.61 (6)	1.05 (8)	-	
1106-292A	4351.0m SWC	WR	0.59 (1)	1.10 (11)	-	

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

GEOCHEM SAMPLE NUMBER	DEPTH	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
			Paraffin Naphthenes	Aromatics	TOTAL	Precipd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	Sulphur
1106-020A	1900-1950	622	105	19	124	236	248	8	6
1106-032A	2100-2110	370	70	41	111	73	138	43	5
1106-054A	2320-2330	150	16	32	48	31	54	8	8
1106-072A	2500-2510	507	168	56	224	84	185	14	0
1106-078A	2560-2570	416	133	36	169	62	122	47	16
1106-087	2650-2660	339	141	25	165	49	70	46	9
1106-108A	2860-2870	144	10	16	27	46	47	19	4
1106-117	2950-2960	406	47	35	81	107	129	80	9
1106-123	3010-3020	328	60	34	94	56	137	40	0
1106-137A	3160-3170	331	82	46	128	48	106	47	2
1106-149A	3280-3290	776	139	80	219	173	271	99	14
1106-167A	3460-3470	217	22	25	47	31	88	51	0
1106-187B	3670-3680	558	98	117	216	128	160	32	22
1106-271A	3714.0	10535	3904	2793	6697	1162	1846	523	308
1106-272A	3716.0	8925	3999	2143	6141	785	1503	320	176
1106-276A	3726.0	1647	483	312	795	417	256	96	83
1106-194A	3740-3750	1134	322	180	502	252	336	32	11
1106-200A	3800-3810	1279	167	317	484	448	244	90	13
1106-282A	3818.0	1534	198	235	433	603	360	89	49
1106-202	3820-3830	203	60	75	136	20	41	5	0
1106-205	3850-3860	4090	3353	393	3746	99	188	50	7
1106-208	3880-3890	820	598	90	688	65	53	15	0
1106-293B	3921.99	354	78	84	163	92	68	32	0
1106-219A	3990-4000	760	562	44	606	57	52	46	0
1106-221A	4010-4020	2170	1077	191	1268	417	264	221	0
1106-226	4060-4070	580	363	56	419	50	64	47	0
1106-231	4110-4120	1385	805	109	914	110	210	146	4
1106-297A	4116.0	1116	520	224	745	188	133	39	12
1106-301A	4129.0	1203	672	258	930	91	134	36	12
1106-236	4170-4180	390	183	38	222	61	66	38	3
1106-243	4240-4250	883	633	91	724	43	82	31	3
1106-253	4340-4350	702	158	87	245	178	158	121	0

TABLE 5b
COMPOSITION (NORMALISED %) OF C₁₅+ MATERIAL EXTRACTED FROM ROCK

GEOCHEM SAMPLE NUMBER	DEPTH	HYDROCARBONS		NON HYDROCARBONS			
		Paraffin – Naphthenes	Aromatics	Precipd. Asphaltenes	Eluted NSO's	Non eluted NSO's	Sulphur
1106-020A	1900-1950	16.82	3.12	38.01	39.88	1.25	0.93
1106-032A	2100-2110	18.94	11.00	19.70	37.27	11.61	1.48
1106-054A	2320-2330	10.77	21.54	20.77	36.15	5.38	5.38
1106-072A	2500-2510	33.10	11.03	16.55	36.55	2.76	0.00
1106-078A	2560-2570	31.95	8.65	15.04	29.32	11.28	3.76
1106-087	2650-2660	41.52	7.31	14.33	20.76	13.45	2.63
1106-108A	2860-2870	7.29	11.46	32.29	32.81	13.54	2.60
1106-117	2950-2960	11.48	8.52	26.30	31.85	19.63	2.22
1106-123	3010-3020	18.35	10.45	17.09	41.80	12.31	0.00
1106-137A	3160-3170	24.86	13.91	14.37	32.16	14.14	0.57
1106-149A	3280-3290	17.91	10.29	22.30	34.87	12.77	1.86
1106-167A	3460-3470	10.00	11.67	14.17	40.83	23.33	0.00
1106-187B	3670-3680	17.61	21.02	23.01	28.69	5.68	3.98
1106-271A	3714.0	37.05	26.51	11.03	17.52	4.96	2.92
1106-272A	3716.0	44.80	24.01	8.80	16.83	3.59	1.97
1106-276A	3726.0	29.30	18.95	25.34	15.56	5.83	5.02
1106-194A	3740-3750	28.38	15.88	22.20	29.68	2.86	1.00
1106-200A	3800-3810	13.06	24.78	35.01	19.05	7.06	1.04
1106-282A	3818.0	12.93	15.30	39.31	23.48	5.80	3.17
1106-202	3820-3830	29.80	37.19	9.85	20.44	2.71	0.00
1106-205	3850-3860	81.97	9.62	2.41	4.60	1.23	0.18
1106-208	3880-3890	72.96	10.92	7.89	6.43	1.80	0.00
1106-293B	3921.99	22.17	23.79	25.93	19.19	8.92	0.00
1106-219A	3990-4000	73.93	5.73	7.45	6.88	6.02	0.00
1106-221A	4010-4020	49.61	8.82	19.22	12.16	10.20	0.00
1106-226	4060-4070	62.50	9.68	8.60	11.05	8.17	0.00
1106-231	4110-4120	58.13	7.90	7.94	15.19	10.53	0.32
1106-297A	4116.0	46.60	20.11	16.80	11.92	3.49	1.07
1106-301A	4129.0	55.88	21.41	7.55	11.13	3.00	1.04
1106-236	4170-4180	46.98	9.87	15.54	17.00	9.87	0.73
1106-243	4240-4250	71.61	10.36	4.90	9.29	3.54	0.30
1106-253	4340-4350	22.56	12.35	25.33	22.56	17.19	0.00

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

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC CARBON (wt. %)	HYDROCARBONS	HYDROCARBONS	TOTAL EXTRACT	P-NAPHTHENES
			TOTAL EXTRACT	ORG. CARBON	ORG. CARBON	AROMATICS
1106-020A	1900-1950	1.44	19.94	0.86	4.32	5.40
1106-032A	2100-2110	0.88	29.94	1.26	4.21	1.72
1106-054A	2320-2330	0.88	32.31	0.55	1.70	0.50
1106-072A	2500-2510	0.76	44.14	2.94	6.67	3.00
1106-078A	2560-2570	0.84	40.60	2.01	4.95	3.70
1106-087	2650-2660	0.75	48.83	2.20	4.51	5.68
1106-108A	2860-2870	0.90	18.75	0.30	1.60	0.64
1106-117	2950-2960	0.96	20.00	0.85	4.23	1.35
1106-123	3010-3020	1.77	28.80	0.53	1.85	1.76
1106-137A	3160-3170	1.24	38.77	1.03	2.67	1.79
1106-149A	3280-3290	1.59	28.20	1.38	4.88	1.74
1106-167A	3460-3470	0.80	21.67	0.59	2.71	0.86
1106-187B	3670-3680	1.90	38.64	1.13	2.94	0.84
1106-271A	3714.0	7.43	63.56	9.01	14.18	1.40
1106-272A	3716.0	6.20	68.81	9.91	14.40	1.87
1106-276A	3726.0	1.88	48.25	4.23	8.76	1.55
1106-194A	3740-3750	1.35	44.26	3.72	8.40	1.79
1106-200A	3800-3810	2.11	37.84	2.29	6.06	0.53
1106-282A	3818.0	2.13	28.23	2.03	7.20	0.84
1106-202	3820-3830	0.95	67.00	1.43	2.17	0.80
1106-205	3850-3860	1.57	91.59	23.86	26.05	8.52
1106-208	3880-3890	0.27	83.87	25.48	30.38	6.68
1106-293B	3921.99	1.44	45.96	1.13	2.46	0.93
1106-219A	3990-4000	0.13	79.66	46.59	58.49	12.90
1106-221A	4010-4020	2.11	58.43	6.01	10.29	5.62
1106-226	4060-4070	0.62	72.18	6.75	9.36	6.45
1106-231	4110-4120	3.63	66.02	2.52	3.81	7.36
1106-297A	4116.0	1.24	66.72	6.01	9.00	2.32
1106-301A	4129.0	1.31	77.28	7.10	9.18	2.61
1106-236	4170-4180	0.23	56.86	9.63	16.94	4.76
1106-243	4240-4250	0.30	81.96	24.14	29.45	6.91
1106-253	4340-4350	0.82	34.92	2.99	8.56	1.83

TABLE 7

ROCKEVAL PYROLYSIS DATA

GEOCHEM SAMPLE NUMBER	DEPTH	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Production INDEX	Hydrogen INDEX	Oxygen INDEX	Tmax (° C)
1106-004A	1100-1500	0.04	0.31	0.82	0.11	83.8	221.6	408
1106-008B	1300-1350	0.03	0.18	0.78	0.14	50.0	216.7	402
1106-012A	1500-1550	0.03	0.39	0.86	0.07	81.2	179.2	417
1106-014A	1600-1650	0.08	1.17	1.51	0.06	153.9	198.7	446
1106-016A	1700-1750	0.07	0.68	0.89	0.09	103.0	134.8	417
1106-018A	1800-1850	0.03	0.64	1.12	0.04	77.1	134.9	416
1106-020A	1900-1950	0.13	3.33	2.07	0.04	124.3	77.2	420
1106-020B	1900-1950	0.16	2.37	1.30	0.06	162.3	89.0	414
1106-022A	2000-2010	0.12	1.00	1.62	0.11	82.0	132.8	396
1106-032A	2100-2110	0.10	0.75	2.25	0.12	75.0	225.0	419
1106-032B	2100-2110	0.14	0.54	2.04	0.21	71.1	268.4	405
1106-042A	2200-2210	0.10	0.78	1.69	0.11	78.0	169.0	425
1106-045A	2230-2240	0.13	0.52	1.62	0.20	59.8	186.2	421
1106-045B	2230-2240	0.12	0.24	1.42	0.33	66.7	394.4	319
1106-048A	2260-2270	0.04	0.33	1.08	0.11	40.7	133.3	424
1106-255A	2285	0.01	0.06	0.59	0.14	30.0	295.0	369
1106-256A	2330	0.02	0.18	0.71	0.10	19.8	78.0	414
1106-257A	2340	0.04	0.13	0.72	0.24	27.7	153.2	403
1106-057A	2350-2360	0.04	0.23	1.09	0.15	27.4	129.8	421
1106-060B	2380-2390	0.10	0.29	1.11	0.26	33.3	127.6	422
1106-258A	2400	0.04	0.15	0.67	0.21	34.1	152.3	403
1106-063A	2410-2420	0.09	0.30	1.16	0.23	34.1	131.8	422
1106-066A	2440-2450	0.08	0.25	1.00	0.24	37.9	151.5	423
1106-069A	2470-2480	0.05	0.18	0.86	0.22	26.5	126.5	416
1106-259A	2494.9	0.22	0.71	0.81	0.24	100.0	114.1	413
1106-075A	2530-2540	0.10	0.62	0.69	0.14	70.5	78.4	427
1106-078A	2560-2570	0.12	0.79	0.66	0.13	83.2	69.5	431
1106-081A	2590-2600	0.08	0.73	0.65	0.10	83.0	73.9	428
1106-261A	2600	0.03	0.75	0.81	0.04	75.0	81.0	428
1106-084A	2620-2630	0.17	1.03	0.90	0.14	110.8	96.8	425
1106-084B	2620-2630	0.11	0.60	0.81	0.15	72.3	97.6	420
1106-087A	2650-2660	0.09	0.58	1.16	0.13	68.2	136.5	425
1106-090A	2680-2690	0.14	0.94	0.79	0.13	105.6	88.8	425
1106-262A	2700	0.02	0.52	1.77	0.04	61.2	208.2	428
1106-093A	2710-2720	0.08	0.16	0.44	0.33	30.8	84.6	417
1106-096A	2740-2750	0.08	0.23	0.83	0.26	37.1	133.9	420
1106-099A	2770-2780	0.06	0.44	0.94	0.12	52.4	111.9	426
1106-263A	2800	0.07	0.39	0.38	0.15	43.3	42.2	426
1106-105A	2830-2840	0.05	0.54	0.84	0.08	60.7	94.4	427
1106-105B	2830-2840	0.05	0.34	1.20	0.13	43.6	153.8	424
1106-108A	2860-2870	0.07	0.46	1.08	0.13	49.5	116.1	431
1106-111A	2890-2900	0.09	0.43	0.65	0.17	52.4	79.3	425
1106-114A	2920-2930	0.11	0.48	1.05	0.19	50.5	110.5	427
1106-117A	2950-2960	0.08	0.60	1.29	0.12	67.4	144.9	429
1106-117B	2950-2960	0.09	0.43	0.75	0.17	53.1	92.6	424
1106-120A	2980-2990	0.15	0.77	1.01	0.16	79.4	104.1	429
1106-123A	3010-3020	0.10	0.70	1.00	0.13	70.7	101.0	433
1106-125A	3040-3050	0.08	0.74	1.06	0.10	77.1	110.4	430
1106-128A	3070-3080	0.13	0.79	0.75	0.14	77.5	73.5	433
1106-131A	3100-3110	0.15	0.71	1.18	0.17	68.3	113.5	433

TABLE 7

ROCKEVAL PYROLYSIS DATA

GEOCHEM		S1	S2	S3	Production	Hydrogen	Oxygen	Tmax
SAMPLE	DEPTH	(mg/g)	(mg/g)	(mg/g)	INDEX	INDEX	INDEX	(°C)
1106-134A	3120-3130	0.15	0.75	0.81	0.17	73.5	79.4	430
1106-264A	3150	0.05	0.20	0.68	0.20	29.0	98.6	428
1106-137A	3160-3170	0.12	1.14	1.44	0.10	85.7	108.3	431
1106-140A	3190-3200	0.11	0.53	0.92	0.17	55.8	96.8	429
1106-143A	3220-3230	0.10	0.65	1.19	0.13	63.7	116.7	431
1106-146A	3250-3260	0.15	0.55	1.16	0.21	59.8	126.1	434
1106-149A	3280-3290	0.14	0.60	1.18	0.19	57.7	113.5	435
1106-152A	3310-3320	0.07	0.36	1.19	0.16	37.9	125.3	431
1106-152B	3310-3320	0.10	0.12	0.63	0.45	13.5	70.8	377
1106-155A	3340-3350	0.12	0.46	1.04	0.21	47.9	108.3	431
1106-158A	3370-3380	0.08	0.15	0.75	0.35	18.5	92.6	375
1106-161A	3400-3410	0.05	0.35	0.69	0.13	46.1	90.8	427
1106-161B	3400-3410	0.06	0.46	0.54	0.12	51.1	60.0	435
1106-164A	3430-3440	0.09	0.63	1.18	0.13	57.8	108.3	434
1106-167A	3460-3470	0.06	0.07	0.38	0.46	8.7	47.5	408
1106-170A	3490-3500	0.02	0.05	0.29	0.29	6.0	34.5	330
1106-173A	3520-3530	0.04	0.19	0.53	0.17	20.9	58.2	419
1106-176A	3550-3560	0.08	0.33	1.67	0.20	36.7	185.6	433
1106-176B	3550-3560	0.08	0.21	0.88	0.28	21.6	90.7	431
1106-178A	3570-3590	0.05	0.23	0.94	0.18	27.1	110.6	428
1106-181A	3610-3620	0.08	0.15	0.66	0.35	16.1	71.0	387
1106-184A	3640-3650	0.08	0.18	0.58	0.31	22.0	70.7	433
1106-187B	3670-3680	0.25	1.01	1.56	0.20	54.0	83.4	433
1106-190A	3700-3710	0.16	0.56	0.46	0.22	40.9	33.6	438
1106-190B	3700-3710	0.03	0.05	0.80	0.38	27.8	444.4	385
1106-269A	3710	0.16	0.98	0.88	0.14	63.2	56.8	437
1106-191A	3710-3720	0.10	0.40	0.42	0.20	37.0	38.9	436
1106-270A	3712	3.71	22.54	0.65	0.14	382.7	11.0	439
1106-271A	3714	4.14	22.62	1.07	0.15	267.4	12.6	435
1106-272A	3716	3.94	18.44	0.63	0.18	260.5	8.9	436
1106-273A	3718	3.73	21.61	1.19	0.15	297.7	16.4	435
1106-274A	3720	0.32	0.56	0.95	0.36	46.3	78.5	432
1106-192B	3720-3730	0.16	1.21	1.00	0.12	84.6	69.9	436
1106-275A	3722	0.37	2.07	0.75	0.15	121.1	43.9	437
1106-276A	3726	0.43	2.98	0.84	0.13	154.4	43.5	441
1106-193A	3730-3740	0.22	1.20	0.98	0.15	77.9	63.6	438
1106-194A	3740-3750	0.29	0.98	0.88	0.23	58.0	52.1	435
1106-277A	3745	0.53	4.64	0.40	0.10	215.8	18.6	439
1106-195A	3750-3760	0.17	0.18	0.64	0.49	14.6	52.0	443
1106-278A	3764.9	0.12	0.63	0.46	0.16	69.2	50.5	435
1106-279A	3776	0.14	0.64	0.33	0.18	62.7	32.4	438
1106-199A	3790-3800	0.28	0.17	0.65	0.62	10.3	39.4	369
1106-280A	3791	0.26	1.45	1.92	0.15	74.7	99.0	441
1106-200A	3800-3810	0.29	0.24	0.58	0.55	12.5	30.2	379
1106-201A	3810-3820	0.41	0.71	1.02	0.37	28.6	41.1	437
1106-281A	3815	0.24	1.20	0.70	0.17	50.4	29.4	439
1106-282A	3818	0.31	2.38	0.31	0.12	97.5	12.7	445
1106-203A	3830-3840	0.38	3.15	0.65	0.11	106.1	21.9	445
1106-208B	3880-3890	0.33	2.47	0.48	0.12	89.8	17.5	444

TABLE 7

ROCKEVAL PYROLYSIS DATA

GEOCHEM SAMPLE NUMBER	DEPTH	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Production INDEX	Hydrogen INDEX	Oxygen INDEX	Tmax (°C)
1106-211C	3910-3920	0.05	0.00	1.13	1.00	0.0	173.8	448
1106-212B	3920-3930	0.40	2.87	0.62	0.12	107.5	23.2	441
1106-293B	3921.99-2	0.32	3.59	0.24	0.08	117.3	7.8	447
1106-294A	3925.88-9	0.22	1.60	0.28	0.12	114.3	20.0	446
1106-213B	3930-3940	0.25	2.50	0.42	0.09	83.3	14.0	446
1106-214B	3940-3950	0.25	2.73	0.29	0.08	142.9	15.2	446
1106-215C	3950-3960	0.42	7.75	0.56	0.05	269.1	19.4	447
1106-217B	3970-3980	0.35	2.68	0.42	0.12	137.4	21.5	445
1106-220B	4000-4010	0.32	3.05	0.37	0.09	131.5	15.9	444
1106-221A	4010-4020	0.32	2.12	0.84	0.13	94.6	37.5	447
1106-295A	4017.10-1	0.04	0.07	0.30	0.36	28.0	120.0	445
1106-296A	4017.60-6	0.05	0.13	0.26	0.28	39.4	78.8	445
1106-224B	4040-4050	0.36	4.01	0.46	0.08	158.5	18.2	446
1106-225A	4050-4060	0.24	1.84	0.46	0.12	93.4	23.4	444
1106-226B	4060-4070	0.29	2.85	0.47	0.09	124.5	20.5	445
1106-285A	4066	0.18	0.70	0.52	0.20	76.1	56.5	439
1106-286A	4078	0.20	0.79	0.35	0.20	74.5	33.0	438
1106-228A	4080-4090	0.28	1.70	0.47	0.14	121.4	33.6	441
1106-287A	4082	0.30	1.87	0.88	0.14	140.6	66.2	441
1106-288A	4096.5	0.17	0.63	0.47	0.21	78.7	58.7	441
1106-297A	4116.00-0	0.40	3.88	0.21	0.09	239.5	13.0	445
1106-298A	4121.50-5	0.45	3.53	0.20	0.11	240.1	13.6	446
1106-299A	4124.00-0	0.40	2.34	0.35	0.15	207.1	31.0	444
1106-300A	4126.90-9	0.29	2.03	0.16	0.13	199.0	15.7	443
1106-301A	4129.00-0	0.49	4.33	0.20	0.10	247.4	11.4	446
1106-302A	4134.00-0	0.19	1.38	0.23	0.12	168.3	28.0	443
1106-303A	4142.00-0	0.25	2.74	0.15	0.08	209.2	11.5	445
1106-304A	4144.00-1	0.24	1.89	0.24	0.11	181.7	23.1	444
1106-238B	4190-4200	0.29	2.38	0.48	0.11	120.2	24.2	443
1106-305A	4190.90-9	0.12	0.79	0.74	0.13	116.2	108.8	444
1106-239B	4200-4210	0.26	3.06	0.33	0.08	156.1	16.8	444
1106-306A	4210.50-5	0.24	2.23	0.27	0.10	145.8	17.6	448
1106-242B	4230-4240	0.27	2.65	0.31	0.09	140.2	16.4	445
1106-244B	4250-4260	0.31	2.27	0.36	0.12	117.6	18.7	443
1106-245B	4260-4270	0.34	2.76	0.35	0.11	133.3	16.9	445
1106-246B	4270-4280	0.30	3.67	0.34	0.08	174.8	16.2	447
1106-248B	4290-4300	0.30	2.81	0.23	0.10	146.4	12.0	445
1106-289A	4293.1	0.20	0.84	2.15	0.19	96.6	247.1	443
1106-290A	4301	0.23	1.01	1.80	0.19	68.2	121.6	452
1106-249B	4310-4320	0.27	1.64	0.35	0.14	80.8	17.2	445
1106-251B	4320-4330	0.27	3.09	0.26	0.08	166.1	14.0	444
1106-254B	4350-4360	0.22	1.70	0.33	0.11	114.9	22.3	442

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

GEOCHEM SAMPLE NUMBER	-020	-032A	-054A	-072A	-078A	-087	-108A
DEPTH	1900– 1950m	2100– 2110m	2320– 2330m	2500– 2510m	2560– 2570m	2650– 2660m	2860– 2870m
SAMPLE TYPE							
nC ₁₅	1.23	0.30	1.13	0.48	0.56	2.16	1.22
nC ₁₆	5.15	6.36	7.66	4.89	2.49	7.93	7.28
nC ₁₇	14.87	23.70	12.54	11.24	4.82	11.90	10.52
nC ₁₈	16.08	28.62	12.54	13.49	6.97	11.76	11.07
nC ₁₉	8.01	19.75	5.00	13.53	9.34	10.58	9.95
nC ₂₀	5.27	5.80	9.11	11.00	9.95	9.59	8.84
nC ₂₁	2.18	1.67	2.45	7.50	9.21	7.41	5.15
nC ₂₂	2.36	1.64	3.36	7.39	8.72	6.85	5.30
nC ₂₃	4.64	1.15	2.50	5.21	7.50	5.63	3.42
nC ₂₄	2.00	0.71	3.31	4.25	7.51	5.21	3.25
nC ₂₅	3.95	0.80	4.70	4.40	6.78	2.10	4.77
nC ₂₆	4.44	0.45	1.34	3.71	4.91	3.61	3.03
nC ₂₇	3.81	1.28	5.63	3.22	4.47	3.13	5.01
nC ₂₈	3.77	0.78	3.93	2.10	4.31	3.12	2.48
nC ₂₉	1.74	1.77	7.95	2.26	4.29	2.77	4.73
nC ₃₀	2.27	0.99	5.04	1.31	2.79	1.78	2.72
nC ₃₁	6.14	1.48	5.73	1.26	0.99	1.54	4.24
nC ₃₂	3.55	0.36	1.50	0.96	1.46	0.89	2.24
nC ₃₃	4.06	1.41	2.73	0.99	0.52	0.89	2.46
nC ₃₄	2.29	0.54	0.82	0.46	1.31	0.52	1.23
nC ₃₅	2.20	0.44	1.04	0.34	1.08	0.63	1.07
PARAFFIN	9.74	20.68	17.71	31.95	43.52	58.10	12.75
ISOPRENOID	1.91	7.59	3.97	4.91	3.02	8.63	2.53
NAPHTHENE	88.35	71.74	78.32	63.14	53.46	33.27	84.73
CPI INDEX A	1.10	0.97	1.09	0.97	1.00	0.85	1.10
CPI INDEX B	1.18	1.95	1.90	1.18	1.04	0.86	1.71
PRISTANE/PHYTANE	0.83	1.08	1.15	1.22	1.08	1.56	1.58
PRISTANE/nC ₁₇	0.60	0.80	0.96	0.75	0.75	0.76	1.16

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

GEOCHEM SAMPLE NUMBER	-117	-123	-137A	-149A	-167A	-187B	-194A
DEPTH	2950– 2960m	3010– 3020m	3160– 3170m	3280– 3290m	3460– 3470m	3670– 3680m	3740– 3750m
SAMPLE TYPE							
nC ₁₅	0.27	2.46	2.19	1.07	0.43	0.31	1.16
nC ₁₆	3.16	6.40	7.76	4.74	1.44	2.78	3.95
nC ₁₇	7.67	8.66	11.92	6.72	4.64	9.53	6.91
nC ₁₈	11.78	10.46	10.95	8.33	9.33	11.09	6.80
nC ₁₉	9.80	8.42	10.42	9.88	10.19	10.90	8.23
nC ₂₀	8.23	5.95	8.14	5.47	9.27	10.09	6.51
nC ₂₁	5.64	2.63	4.86	3.98	5.24	7.86	6.24
nC ₂₂	6.10	2.97	4.48	4.36	6.30	7.29	6.16
nC ₂₃	4.59	2.62	3.82	4.41	4.18	6.37	5.78
nC ₂₄	4.78	2.27	2.83	3.73	4.68	5.67	5.26
nC ₂₅	4.81	4.25	4.31	5.20	5.05	5.42	6.73
nC ₂₆	3.69	2.57	2.80	3.50	4.66	3.52	5.29
nC ₂₇	5.11	7.87	4.97	7.09	5.53	3.94	5.55
nC ₂₈	3.68	3.29	3.17	4.44	4.58	2.52	4.77
nC ₂₉	5.43	9.70	4.96	7.22	6.11	2.89	4.53
nC ₃₀	3.30	4.14	3.85	5.98	4.67	2.05	3.00
nC ₃₁	4.55	7.89	3.99	5.29	4.68	2.34	2.94
nC ₃₂	1.99	2.09	1.60	2.07	3.26	0.88	2.03
nC ₃₃	2.63	3.38	1.51	3.74	2.79	1.62	3.37
nC ₃₄	1.58	1.03	0.57	1.44	1.87	1.64	2.36
nC ₃₅	1.20	0.93	0.90	1.35	1.13	1.29	2.44
PARAFFIN	16.00	15.95	24.10	15.83	27.31	23.86	21.44
ISOPRENOID	2.10	2.27	4.69	2.01	2.50	5.22	1.87
NAPHTHENE	81.90	81.78	71.20	82.16	70.19	70.93	76.69
CPI INDEX A	0.99	1.41	1.17	1.25	0.90	1.06	1.09
CPI INDEX B	1.43	2.44	1.52	1.48	1.20	1.34	1.19
PRISTANE/PHYTANE	1.02	1.43	2.40	1.79	0.80	2.28	2.73
PRISTANE/nC ₁₇	0.86	0.97	1.15	1.21	0.88	1.60	0.92

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

GEOCHEM SAMPLE NUMBER	-200	-202	-205	-208	-219A	-221A	-226
DEPTH	3800-3810m	3820-3830m	3850-3860m	3880-3890m	3990-4000m	4010-4020m	4060-4070m
SAMPLE TYPE							
nC ₁₅	2.54	2.43	2.00	2.69	2.48	0.95	0.61
nC ₁₆	6.14	6.82	2.39	4.10	6.06	2.52	5.65
nC ₁₇	8.13	8.61	3.44	6.21	9.42	3.86	7.16
nC ₁₈	10.82	8.35	4.02	6.09	9.46	6.61	7.61
nC ₁₉	11.35	8.77	5.07	7.42	9.31	7.55	8.84
nC ₂₀	7.97	7.43	4.60	6.49	7.92	7.68	7.65
nC ₂₁	6.88	5.63	2.29	5.68	6.20	8.04	6.17
nC ₂₂	6.54	5.70	2.72	6.25	5.32	7.49	6.66
nC ₂₃	5.92	5.53	1.73	5.28	4.43	8.13	5.80
nC ₂₄	5.10	4.48	0.96	9.30	4.08	6.98	6.42
nC ₂₅	5.40	5.22	4.63	5.21	3.57	5.84	5.18
nC ₂₆	3.98	3.80	3.65	3.89	3.02	4.82	5.07
nC ₂₇	4.05	5.50	3.69	0.57	2.81	5.64	4.07
nC ₂₈	2.87	3.80	4.16	6.85	0.71	4.17	6.63
nC ₂₉	2.89	3.40	3.09	1.59	2.08	3.03	3.17
nC ₃₀	2.12	3.62	13.88	1.28	4.15	2.24	2.87
nC ₃₁	1.84	3.47	15.51	5.06	6.33	3.05	2.03
nC ₃₂	1.07	1.87	10.84	5.67	2.68	2.19	1.51
nC ₃₃	1.90	2.22	6.38	7.01	2.14	4.85	2.00
nC ₃₄	1.48	1.38	4.67	0.90	4.24	3.51	2.66
nC ₃₅	1.03	1.98	0.28	2.47	3.60	0.85	2.24
PARAFFIN	25.19	19.72	3.09	4.85	6.83	12.14	8.28
ISOPRENOID	3.55	2.66	0.29	0.73	0.90	0.60	0.69
NAPHTHENE	71.26	77.62	96.62	94.42	92.27	87.25	91.03
CPI INDEX A	1.07	1.13	1.05	0.64	1.07	1.10	0.84
CPI INDEX B	1.21	1.23	1.01	0.64	1.32	1.14	0.79
PRISTANE/PHYTANE	2.79	1.93	0.94	1.64	1.77	1.68	1.98
PRISTANE/nC ₁₇	1.27	1.03	1.33	1.52	0.89	0.81	0.77

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

GEOCHEM SAMPLE NUMBER	-231	-236	-243	-253	-271A	-272A	-276A
DEPTH	4110- 4120m	4170- 4180m	4240- 4250m	4340- 4350m	3714.0m SWC	3716.0m SWC	3726.0m SWC
SAMPLE TYPE							
nC ₁₅	2.36	5.59	4.29	1.54	3.21	14.30	2.14
nC ₁₆	4.95	6.54	4.82	3.65	8.23	12.94	6.88
nC ₁₇	5.99	7.46	5.51	5.44	8.49	11.33	8.05
nC ₁₈	6.68	7.72	5.35	6.68	8.57	8.54	6.85
nC ₁₉	8.90	8.52	7.21	7.57	11.56	9.07	7.88
nC ₂₀	7.40	7.21	5.19	7.99	7.17	7.38	6.31
nC ₂₁	5.23	5.74	4.63	6.79	6.12	5.09	5.76
nC ₂₂	4.57	5.98	5.11	7.42	6.51	4.99	5.59
nC ₂₃	4.29	4.81	4.42	6.49	4.69	3.53	5.73
nC ₂₄	5.94	4.86	4.76	6.20	8.86	3.32	5.94
nC ₂₅	6.26	5.37	7.05	7.23	6.16	2.79	6.39
nC ₂₆	4.68	4.46	3.83	5.44	4.41	2.79	5.04
nC ₂₇	4.09	3.72	2.82	5.54	4.03	1.84	5.86
nC ₂₈	3.95	3.47	4.26	4.57	2.03	1.92	4.49
nC ₂₉	2.59	3.27	2.47	4.34	2.22	1.69	4.53
nC ₃₀	4.54	3.19	4.35	3.22	1.56	1.43	2.94
nC ₃₁	3.86	2.97	2.20	2.70	1.10	1.26	2.89
nC ₃₂	3.68	2.00	3.08	2.49	1.34	1.08	1.46
nC ₃₃	2.04	2.18	4.75	2.04	1.20	1.25	1.99
nC ₃₄	2.34	2.68	8.41	1.52	1.31	1.83	1.83
nC ₃₅	5.66	2.26	5.50	1.14	1.23	1.63	1.45
PARAFFIN	5.45	14.84	6.64	40.47	19.04	14.00	21.51
ISOPRENOID	0.37	1.92	0.54	3.54	3.53	3.05	3.22
NAPHTHENE	94.17	83.24	92.82	55.99	77.43	82.95	75.27
CPI INDEX A	0.96	0.96	1.03	1.03	0.87	0.87	1.08
CPI INDEX B	0.94	1.06	0.89	1.14	1.12	0.93	1.24
PRISTANE/PHYTANE	1.27	1.41	1.19	1.56	1.28	1.53	4.37
PRISTANE/nC ₁₇	0.64	1.01	0.80	0.98	1.23	1.16	1.51

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

GEOCHEM SAMPLE NUMBER	-282A	-293B	-297A	-301A
DEPTH	3818.0m SWC	3921.99- 3922.0m	4116.00- 4116.05m	4129.00- 4129.05m
SAMPLE TYPE	CORE	CORE	CORE	CORE
nC ₁₅	1.63	0.60	2.31	2.58
nC ₁₆	3.84	1.31	9.11	7.62
nC ₁₇	6.27	3.08	9.51	8.14
nC ₁₈	7.37	5.02	8.90	7.47
nC ₁₉	8.05	6.11	8.81	7.69
nC ₂₀	6.91	6.91	8.12	7.37
nC ₂₁	6.24	7.20	7.68	7.29
nC ₂₂	6.55	7.59	6.82	6.52
nC ₂₃	6.31	7.59	6.28	7.11
nC ₂₄	6.31	7.93	5.22	5.87
nC ₂₅	6.33	7.69	5.06	6.05
nC ₂₆	5.71	6.69	3.79	4.62
nC ₂₇	5.82	6.12	3.46	4.43
nC ₂₈	4.70	5.80	2.74	3.57
nC ₂₉	4.73	5.28	2.58	3.33
nC ₃₀	3.02	3.71	2.06	2.28
nC ₃₁	3.19	3.24	2.14	2.12
nC ₃₂	2.11	2.29	1.66	1.53
nC ₃₃	2.21	2.41	1.79	1.65
nC ₃₄	1.73	1.98	1.49	1.52
nC ₃₅	0.97	1.44	0.45	1.25
PARAFFIN	54.58	35.78	33.97	29.65
ISOPRENOID	6.74	1.29	2.53	2.60
NAPHTHENE	38.68	62.93	63.51	67.75
CPI INDEX A	1.01	1.00	1.08	1.11
CPI INDEX B	1.15	1.07	1.12	1.15
PRISTANE/PHYTANE	2.39	1.82	2.70	3.33
PRISTANE/nC ₁₇	1.39	0.75	0.57	0.83

TABLE 9

MOLECULAR MATURATION PARAMETERS

GEOCHEM SAMPLE NO.	DEPTH	STERANES M/Z 217 (259)			Tm Ts	TERPANES M/Z 191				x 100
		$\frac{C_{29} \text{ 20S } (\alpha\alpha)}{C_{29} \text{ 20R } (\alpha\alpha)}$	$\frac{C_{29} \text{ 20R } (\beta\beta)}{C_{29} \text{ 20R } (\alpha\alpha)}$	$\frac{C_{27} \text{ (20S) Diasteranes}}{C_{27} \text{ (20R) Diasteranes}}$		$\frac{C_{30} \text{ Moretane}}{C_{30} \text{ Hopane}}$	$\frac{C_{29} \text{ normoretane}}{C_{29} \text{ norhopane} + C_{29} \text{ normoretane}}$	$\frac{\text{Bisnorhopane } (C_{28})}{Tm + \text{Bisnorhopane} + C_{29} \text{ norhopane}}$	$\frac{C_{31} \text{ (20S)}}{C_{31} \text{ (20S)} + C_{31} \text{ (20R)}}$	
1106-084	2620-630m	0.43	0.43	1.44	1.88	0.18	0.29	0.64	30%	
1106-108	2860-870m	0.76	0.47	1.24	5.33	0.27	0.54	0.57	14%	
1106-123	3010-020m	0.50	0.58	1.24	6.66	0.26	0.41	0.21	9%	
1106-137	3160-170m	0.26	-	1.36	14	0.44	0.39	-	8%	
1106-149	3280-290m	0.38	0.50	1.67	12	0.38	0.36	0.05	13%	
1106-271	3714.0m SWC	1.74	1.89	1.52	1.33	0.07	0.09	0.13	59%	
1106-272	3716.0m SWC	1.74	1.74	1.45	1.35	0.07	0.09	0.13	60%	
1106-276	3726.0m SWC	1.10	1.43	1.65	1.97	0.14	0.09	0.13	60%	
1106-194	3740-750m	1.00	1.10	1.48	3.03	0.17	0.14	0.08	58%	
1106-200	3800-810m	0.96	1.00	1.57	6.4	0.21	0.12	0.03	57%	
1106-202	3820-830m	0.82	0.94	1.40	3.20	0.24	0.22	0.04	23%	
1106-205	3850-860m	0.83	0.99	1.66	1.25	-	0.20	0.07	55%	
1106-208	3880-890m	0.94	1.10	1.50	1.26	-	0.19	0.07	58%	
1106-293	3921.99-3922.0m CORE	1.04	1.51	1.59	5.0	0.14	0.08	0.11	58%	
1106-219	3990-4000m	0.91	1.09	1.45	1.12	0.15	0.15	0.06	60%	
1106-221	4010-020m	0.86	1.01	1.41	1.27	0.23	0.18	0.07	59%	
1106-226	4060-070m	0.84	1.07	1.48	1.30	0.15	0.15	0.06	57%	

TABLE 9

MOLECULAR MATURATION PARAMETERS

GEOCHEM SAMPLE NO.	DEPTH	STERANES M/Z 217 (259)			Tm Ts	TERPANES M/Z 191				x 100
		$\frac{C_{29} \text{ 20S } (\alpha\alpha)}{C_{29} \text{ 20R } (\alpha\alpha)}$	$\frac{C_{29} \text{ 20R } (\beta\beta)}{C_{29} \text{ 20R } (\alpha\alpha)}$	$\frac{C_{27} \text{ (20S) Diasteranes}}{C_{27} \text{ (20R) Diasteranes}}$		$\frac{C_{30} \text{ Moretane}}{C_{30} \text{ Hopane}}$	$\frac{C_{29} \text{ normoretane}}{C_{29} \text{ norhopane} + C_{29} \text{ normoretane}}$	$\frac{\text{Bisnorhopane } (C_{28})}{Tm + \text{Bisnorhopane} + C_{29} \text{ norhopane}}$	$\frac{C_{31} \text{ (20S)}}{C_{31} \text{ (20S)} + C_{31} \text{ (20R)}}$	
1106-231	4110-120m	0.86	1.00	1.58	1.34	0.16	0.19	0.05	48%	
1106-297	4116.00-.05m CORE	1.45	2.00	1.43	1.62	0.07	0.15	0.16	61%	
1106-301	4129.0-.05m CORE	1.40	2.36	1.43	1.33	0.07	0.15	0.20	62%	
1106-236	4170-180m	0.90	1.17	1.44	1.22	0.14	0.16	0.07	55%	
1106-243	4240-250m	0.95	1.28	1.44	1.25	0.14	0.15	0.06	58%	

TABLE 10

COMPOSITION (NORMALISED %) OF C₁₅₊ AROMATIC HYDROCARBONS- PHENANTHRENE SERIES

<u>GEOCHEM</u> <u>SAMPLE</u> <u>NUMBER</u>	<u>DEPTH</u>	<u>PHENANTHRENE</u> <u>(M/Z 178)</u>	<u>METHYL</u> <u>PHENANTHRENE</u> <u>(M/Z 192)</u>	<u>DIMETHYL</u> <u>PHENANTHRENE</u> <u>(M/Z 206)</u>	<u>TRIMETHYL</u> <u>PHENANTHRENE</u> <u>(M/Z 220)</u>
1106-084	2620-630m	17.5	34.3	33.6	14.6
1106-108	2860-870m	24.1	35.0	27.4	13.5
1106-123	3010-020m	25.1	32.0	27.0	15.9
1106-137	3160-170m	25.8	29.9	30.4	13.9
1106-149	3280-290m	25.6	34.5	27.3	12.6
1106-271	3714.0m SWC	17.9	36.0	31.0	15.1
1106-272	3716.0m SWC	17.1	36.6	31.7	14.6
1106-276	3726.0m SWC	22.8	39.0	27.4	10.8
1106-194	3740-750m	27.6	36.3	26.2	9.9
1106-200	3800-810m	32.8	39.2	21.3	6.7
1106-202	3820-830m	28.8	36.3	25.5	9.4
1106-205	3850-860m	17.0	30.0	33.2	19.8
1106-208	3880-890m	20.8	32.6	30.8	15.8
1106-293	3921.99-3922.0m CORE	28.3	42.4	23.8	5.5
1106-219	3990-4000m	26.4	34.9	28.0	10.7
1106-221	4010-020m	34.8	38.6	20.7	5.9
1106-226	4060-070m	27.4	38.3	25.6	8.7
1106-231	4110-120m	28.9	34.8	26.4	9.9
1106-297	4116.00-.05m CORE	18.1	39.2	31.6	11.1
1106-301	4129.0-.05m CORE	20.6	37.7	30.5	11.2
1106-236	4170-180m	30.4	35.2	25.1	9.3
1106-243	4240-250m	24.4	37.2	28.0	10.4

TABLE 11

COMPOSITION (NORMALISED %) OF C₁₅₊ AROMATIC HYDROCARBONS
- DIBENZOTHIOPHENE SERIES

<u>GEOCHEM</u> <u>SAMPLE</u> <u>NUMBER</u>	<u>DEPTH</u>	<u>DIBENZOTHIOPHENE</u> <u>(M/Z 184)</u>	<u>METHYL</u> <u>DIBENZOTHIOPHENE</u> <u>(M/Z 198)</u>	<u>DIMETHYL</u> <u>DIBENZOTHIOPHENE</u> <u>M/Z 212)</u>
1106-084	2620-630m	9.6	39.5	50.9
1106-108	2860-870m	12.2	44.4	43.4
1106-123	3010-020m	11.3	38.9	49.8
1106-137	3160-170m	10.7	38.9	50.4
1106-149	3280-290m	10.0	44.3	45.7
1106-271	3714.0m SWC	18.5	46.9	34.6
1106-272	3716.0m SWC	20.1	46.0	33.9
1106-276	3726.0m SWC	36.0	44.5	19.5
1106-194	3740-750m	24.7	45.3	30.0
1106-200	3800-810m	34.5	40.7	24.8
1106-202	3820-830m	18.9	46.1	35.0
1106-205	3850-860m	7.1	34.3	58.6
1106-208	3880-890m	11.7	36.7	51.6
1106-293	3921.99-3922.0m CORE	31.3	50.4	18.3
1106-219	3990-4000m	11.8	41.4	46.8
1106-221	4010-020m	20.4	43.7	35.9
1106-226	4060-070m	15.2	42.3	42.5
1106-231	4110-120m	15.1	40.5	44.4
1106-297	4116.00-.05m CORE	15.0	49.6	35.4
1106-301	4129.0-.05m CORE	15.2	48.5	36.3
1106-236	4170-180m	16.4	42.2	41.4
1106-243	4240-250m	13.5	41.1	45.4

TABLE 12

METHYL PHENANTHRENE INDEX

SAMPLE NUMBER	DEPTH	% AREA	% HEIGHT
1106-020A	1900-1950	1.06	0.87
1106-032A	2100-2110	1.24	1.02
1106-054A	2320-2330	0.56	0.66
1106-072A	2500-2510	0.79	0.85
1106-078A	2560-2570	0.73	0.80
1106-087	2650-2660	0.68	0.73
1106-108A	2860-2870	0.49	0.51
1106-117	2950-2960	0.62	0.66
1106-123	3010-3020	0.59	0.59
1106-137A	3160-3170	0.65	0.67
1106-149A	3280-3290	0.61	0.64
1106-167A	3460-3470	0.78	0.77
1106-187B	3670-3680	0.60	0.63
1106-271A	3714.0	0.65	0.49
1106-272A	3716.0	0.45	0.55
1106-276A	3726.0	0.55	0.53
1106-194A	3740-3750	0.55	0.59
1106-200A	3800-3810	0.55	0.58
1106-282A	3818.0	0.62	0.65
1106-202	3820-3830	0.59	0.58
1106-205	3850-3860	0.55	0.70
1106-208	3880-3890	0.67	0.69
1106-293B	3921.99-0	0.54	0.62
1106-219A	3990-4000	0.76	0.85
1106-221A	4010-4020	0.55	0.61
1106-226	4060-4070	0.79	0.74
1106-231	4110-4120	0.57	0.61
1106-297A	4116.0-4116-05	0.56	0.63
1106-301A	4129.0-4129-05	0.58	0.68
1106-236	4170-4180	0.58	0.61
1106-243	4240-4250	0.66	0.65
1106-253	4340-4350	0.58	0.63

TABLE 13

GOGI INDEX

<u>GEOCHEM</u> <u>SAMPLE</u> <u>NUMBER</u>	<u>DEPTH</u>	<u>% C₁</u>	<u>% C₂-C₅</u>	<u>% C₆-C₁₄</u>	<u>% C₁₅+</u>
1106-020A	1900-950m	20.01	39.50	37.53	2.96
1106-032A	2100-110m	28.43	48.99	22.58	0
1106-111A	2890-900m	31.19	56.85	11.96	0
1106-146A	3250-260m	29.36	42.06	28.37	0.21
1106-164A	3430-460m	32.03	43.45	24.17	0.35
1106-187B	3670-680m	26.14	53.87	19.38	0.61
1106-214C	3940-950m	30.95	29.75	26.96	12.34
1106-215C	3950-960m	13.06	32.16	46.70	8.08
1106-221A	4010-020m	12.22	32.72	44.47	10.59
1106-245B	4260-270m	7.50	38.22	52.80	1.48
1106-261A	2600.0m SWC	12.09	35.09	42.57	10.25
1106-270A	3712.0m SWC	10.74	29.78	45.47	14.01
1106-273A	3718.0m SWC	13.14	29.04	47.38	10.44
1106-275A	3722.0m SWC	8.23	39.48	44.62	7.67
1106-277A	3745.0m SWC	7.89	36.85	43.06	12.20
1106-278A	3764.9m SWC	7.58	45.80	44.65	1.97
1106-282A	3818.0m SWC	19.75	43.18	32.52	4.55
1106-285A	4066.0m SWC	12.34	49.61	35.27	2.78
1106-289A	4293.1m SWC	19.33	37.49	33.36	9.82
1106-293B	3921.99-3922.0m CORE	13.68	39.03	37.30	9.99
1106-297A	4116.00-.05m CORE	9.46	30.05	45.33	15.16
1106-303A	4142.0-03m CORE	10.41	31.16	43.24	15.19
1106-306A	4210.50-.55m CORE	13.58	32.82	40.04	13.56

TABLE 14
CARBON ISOTOPE RESULTS

0/00 PDB

<u>GEOCHEM SAMPLE NUMBER</u>	<u>DEPTH</u>	<u>PARAFFIN- NAPHTHENE</u>	<u>AROMATICS</u>	<u>TOTAL EXTRACT</u>
1106-084	2620-630m	-29.06*	-28.00*	-28.71
1106-108	2860-870m	-28.93*	-27.89*	-28.25
1106-123	3010-020m	-27.66*	-27.45*	-27.68
1106-137	3160-170m	-28.75*	-26.90*	-27.55
1106-149	3280-290m	-	-	-27.86
1106-271A	3714.0m SWC	-31.56	-30.91	-31.05
1106-272A	3716.0m SWC	-31.57	-30.74	-30.97
1106-276A	3726.0m SWC	-27.94*	-27.23*	-27.51
1106-194A	3740-750m	-	-	-26.49
1106-200A	3800-810m	-27.36*	-25.05*	-25.22
1106-202	3820-830m	-28.17*	-27.39*	-28.40
1106-205A	3850-860m	-28.13	-	-28.07
1106-208A	3880-890m	-28.17*	-28.16*	-28.05
1106-293B	3921.99-3922.0m CORE	-30.72*	-27.44*	-26.70
1106-219	3990-4000m	-28.18	-27.25	-27.95
1106-226	4060-070m	-27.77*	-	-27.84
1106-231	4110-120m	-27.78*	-	-27.73
1106-297	4116.00-.05m CORE	-29.07	-27.46	-28.32
1106-301A	4129.0-.05m CORE	-28.52	-27.13	-27.94
1106-243	4240-250m	-27.63*	-27.18*	-28.06

* - very small sample (<0.5mg)