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VIC/P30
LA BELLA-1
WELL COMPLETION REPORT
INTERPRETATIVE



OTWAY BASIN, VIC/P30

LA BELLA-1

**WELL COMPLETION REPORT
INTERPRETATIVE DATA**

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GEOCHEMICAL EVALUATION OF LA BELLA-1

OTWAY BASIN

OFFSHORE VICTORIA AUSTRALIA

PREPARED BY: J. PRESTON
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DATE: March, 1994

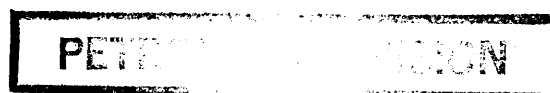


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1 INTRODUCTION

Following completion of the La Bella-1 well, a programme was undertaken to evaluate the source rock character and thermal maturity of the drilled sequence, and the fluids recovered from it.

The evaluation of source rock character firstly involved analysis of nine sidewall cores for total organic carbon (TOC) content by Geotech, Perth. All the samples analysed yielded a TOC greater than 1.0%, and were accordingly pyrolysed by the Rock-Eval method.

In an attempt to evaluate the thermal maturity of the La Bella-1 section, vitrinite reflectance measurements were made on nine SWCs from the wells.

During petrographic analysis of a core sample (from 2095.15-2095.20m), Amdel, Adelaide, reported a trace of hydrocarbon. The sample was sent to Geotech, Perth, for solvent-extraction and whole-extract GC analysis to determine the nature of this trace. TOC/Rock-Eval pyrolysis was also performed on this sample.

A further seven samples (two core fragments, four SWCs and one cuttings sample), from four separate reservoir units and an intra-formational claystone, were solvent-extracted in an attempt to establish the presence of residual hydrocarbons. All of the resulting extracts were analysed by the whole-extract GC method; five extracts (from one core, three SWCs and one cuttings sample) were then separated by liquid chromatography, and analysed by saturate-fraction GC, SIR GC-MS (branched/cyclics), and SIR GC-MS (aromatics) techniques.

Two gas samples, recovered by RFT from 2072.8m and 2160.5m, were analysed by CSIRO, North Ryde, for their chemical and stable carbon isotopic compositions. Finally, in an attempt to gain more information relating to the source of the gases and their associated fluids, the RFT gas samples were subjected to cold-trapping by Petrolab, Adelaide, and two condensate samples isolated. These liquids were then analysed by whole-oil GC, separated, and analysed by the saturate fraction GC, GC-MS (branched/cyclics) and GC-MS (aromatics) techniques.

This report provides a compilation of the petroleum geochemistry data obtained from the La Bella-1 well, together with an interpretation of these data.

2 SOURCE ROCK CHARACTERISATION

2.1 Screening Analyses

2.1.1 Total Organic Carbon (TOC)

As indicated in Table 1-1, the ten samples analysed for total organic content (TOC) originated in the Late Cretaceous Sherbrook and Shipwreck Groups. Although 0.5% TOC is commonly used as the minimum requirement for a petroleum source rock, it is uncommon for sediments from the southern margin of Australia with less than 1.0% TOC to be significant petroleum sources. On the basis of ten samples, it is clear that the Late Cretaceous section in La Bella-1 contains significant potential petroleum source rocks, their TOC values ranging from 1.10-2.35% (Table 2, Figure 1 and Enclosure 1). Note that one sample, from 2540.5m, consisted of coal (TOC=73.30%).

2.1.2 Rock-Eval Pyrolysis

All ten samples (in which the TOC was found to exceed 1.0%) were pyrolysed using the Rock-Eval method. Nine of these samples from 1563-2528m, gave HI values of 94-183 and S1+S2 yields of 1.62-4.61 mg/g TOC (Figures 2 and 3), indicating fair to moderate generative potential for gas and condensate, with perhaps minor amounts of light oil. The data from the 2540.5m sample (HI=258) suggest that there is greater potential for liquids generation in the coals.

It is clear from the S1+S2 yields of the La Bella-1 samples that expulsion, if any, would be possible only at relatively high levels of thermal maturity. At such levels of thermal maturity, considerable secondary cracking of liquids to gas would occur, such that these source rocks would perhaps be more "gas prone" than indicated by the source character data.

The Rock-Eval pyrolysis data listed in Table 2 are summarised in the form of crossplots in Figures 4 and 5. Figure 4 reflects the overall quality of the kerogen in the samples analysed, in terms of their oil-prone or gas-prone character: most samples plot in the gas/condensate-prone Type II/III and Type III areas of the diagram (HI < 200). The more liquids-prone character of the coal sample is reflected in its more obvious Type II affinity. Figure 5 reflects the generative capacity of the samples, in terms of their overall quantitative potential; only the coal sample approaches the threshold of significant hydrocarbon generation and expulsion, the remainder failing due to thermal immaturity (the Tmax of the 2232m sample is regarded as anomalously high).

Maceral petrography associated with the vitrinite reflectance determinations shows that the organic matter in most of the samples is dominated by inertinite, followed by vitrinite (Figure 6). However, liptinitic/exinitic (Type II) macerals are identified in all samples except the 2540.5m coal (described as 100% vitrinite), confirming the presence of some liquids-prone components. In the Sherbrook Group, the Type II macerals are supplemented by oil-prone alginitic (Type I) macerals, a reflection of the perhaps marginal-marine affinity of these sediments.

2.2 Thermal Maturity

Rock-Eval parameters which are often used for maturity assessment are Tmax and Production Index (PI). A Tmax value of 435°C, and a PI value of 0.10, are regarded as marking the entrance to the oil-generative window.

As Table 2 and Figure 7 show, values of Tmax range from 423-440°C, with one anomalous value of 449°C. Values of PI (Figure 8) are less than 0.10 in the Shipwreck interval (below 2095m), but range from 0.13-0.21 in the overlying Sherbrook Group. There is therefore an agreement between the maturity estimates based on the PI and Tmax data in the Shipwreck Group, namely that this section is thermally immature to marginally mature.

Vitrinite reflectance measurements on nine samples from the 1563-2646.5m interval do not exceed 0.70% (see Table 3/ 3A and Figures 9 and 10). Values for five samples in the Shipwreck Group (2232-2646.5m) occupy the 0.62-0.67% range, concurring with the marginally mature estimate based on Rock-Eval data. With the exception of a value of 0.68% at 1979m, the Sherbrook Group can be considered to be thermally immature.

Because kerogens will generate products with markedly different compositions as thermal maturity progresses (Horsfield, 1989), it follows that certain analyses and the interpretation of their results will be fundamentally affected by maturity, in particular Rock-Eval pyrolysis data. The observation that the drilled interval has not attained thermal maturity means that this need not be a consideration in the interpretation of geochemical data from the La Bella-1 well. The poor source quality of parts of the drilled sequence cannot be attributed to advanced thermal maturity.

3 FLUIDS CHARACTERISATION

3.1 Whole-Oil GC Analysis

Two condensate samples from the La Bella-1 well were analysed by the whole-oil GC method. These samples were obtained by the cold-trapping of gas samples from 2072.8m and 2160.5m.

The whole-oil GC data for these two samples are presented in Tables 4 and 5; the corresponding whole-oil GC traces are shown in Figure 11 (C_1 - C_{33} range), Figure 12 (C_1 - C_8 gasoline range), and Figure 13 (normalised plots). Compound abundances normalised from the whole-oil GC data are compared in Figure 14.

Paraffin Index data from the two condensates are plotted in Figure 15, and suggest (if taken at face value) that the condensates were expelled from their source rocks at about 135°C.

3.2 Whole-Extract GC Analysis

During petrographic analysis of a core sample (2095.15 - 2095.20m), Amel Laboratories, Adelaide, reported a trace of hydrocarbon. The sample was sent to Geotech, Perth, for solvent-extraction and whole-extract GC analysis to determine the nature of this trace. A further seven samples (two core fragments, four SWCs and one cuttings sample), from four separate reservoir units and an intra-formational claystone, were solvent-extracted in an attempt to establish the presence of residual hydrocarbons. The resulting extract yields are listed in Table 6, and summarised in Figure 16. All the extracts were analysed by the whole-extract GC method, the GC traces being shown in Figures 17a-d.

As Figure 16 shows, the extract yields ranged from 244-784 ppm. These results, combined with the character of the whole-extract GC traces, suggest that the extracts are unlikely to represent residual saturations of mature migrated hydrocarbons, but instead appear to represent small amounts of indigenous, or very locally migrated, immature hydrocarbons. However, a more detailed evaluation of the extracts was warranted to confirm their character, and to determine any similarities between the compositions of the extracts and those of known migrated fluids (see below).

3.3 Saturate Fraction GC Analyses

Both condensate samples, and five of the eight sediment extracts, were separated into their constituent fractions by liquid chromatography, the separation data being listed in Tables 6 and 7, and summarised in Figure 18.

The saturate fraction of each condensate, and of each of the five extracts, was analysed by the saturate fraction GC method. The resulting saturate GC traces of the condensates are shown in Figure 19; the n-alkane distribution data are reported in Table 8, normalised in Figure 20, and compared in Figure 21. The saturate GC traces for the five sediment-extracts are shown in Figure 22a-c; the n-alkane distribution data are reported in Table 9, normalised in Figure 23, and compared in Figure 24.

The n-alkane compositional data for the condensates and sediment-extracts are listed in Tables 10 and 11 respectively, and summarised in Figures 25 and 26. The condensates and extracts alike contain Pr/Ph ratios over 4.0, and ratios of Pr/nC₁₇ to Ph/nC₁₈ greater than 2.3, suggesting that the extracts were derived from higher land-plant-derived organic material within source sediments deposited in oxic, terrestrial environments.

While the 2070m, 2097.7m and 2159m extracts each contain high molecular weight, odd-preferenced waxy components within their n-alkane distributions, the 2100-2110m and 2121m extracts show different characters. The 2100-2110m extract displays a conical hump of unresolved compounds in its higher molecular weight range, characteristic of a component of contamination in the extract. The 2121m extract contains proportionally few higher molecular weight compounds, though a subtle waxy hump is evident.

3.4 GC-MS (Branched/Cyclics) Analysis

The branched and cyclic compounds were isolated from the saturate fractions of the two condensates and five extracts and analysed by the SIR GC-MS technique. Selected m/z 191 (triterpane) and m/z 217 (sterane) biomarker distributions are given in Figures 27-33; full suites of mass fragmentograms are provided in this report as Appendices 1 and 3.

Detailed compound abundances and calculated parameters are listed in Tables 12 to 18; normalised compound abundances and values for calculated parameters for the m/z 191 ions (terpanes) are summarised in Figures 34a-40a, and for the m/z 217 ions (steranes) in Figures 34b-40b. Figures 41 and 42 compare normalised compound abundances and values of calculated parameters for the condensates and extracts.

3.4.1 Terpane Parameters

The relative abundance of C_{27} triterpanes, $18\alpha(H)$ -hopane (Ts) and $17\alpha(H)$ -hopane (Tm), is theoretically useful for the maturity assessment of medium to high maturity oils. With increasing maturity, more of the maturable C_{27} triterpane (Tm) is converted to the stable C_{27} triterpane (Ts). The relative amounts of Ts and Tm in the extracts show a strong predominance of maturable (Tm) over stable (Ts) ($Ts/Ts+Tm = 5-17\%$), suggesting that they are thermally immature. By contrast, there is only a slight predominance of Tm in the condensates, implying greater thermal maturity. However, the $Ts/Ts+Tm$ parameter is lithofacies-dependent, and should be used with some caution as an absolute indicator of thermal maturity (it is best used as a maturity indicator of oils from a common source of consistent organic facies).

Moretanes are diastereomers of the hopanes, and, being less stable than the latter, are destroyed more rapidly with increasing maturity. The moretane/hopane ratio decreases from about 0.80 in immature bitumens to values of 0.15-0.05 in mature source rocks and oils. The relative abundances of the C_{29} and C_{30} moretanes and hopanes in the extracts revealed a predominance of hopanes (moretane/hopane = 0.16-0.24), implying that they are perhaps marginally mature. Values of 0.06-0.12 in the condensates reflect their greater maturity. (Note that, like $Ts/Ts+Tm$, the moretane/hopane parameter is to some extent lithofacies-dependent, its value, for example, being higher in Tertiary source rocks.)

The $C_{31}22S$ -hopane/ $C_{31}22R$ -hopane ratio can be used to assess thermal maturity. As maturity increases, the proportion of the 22S isomer increases at the expense of the biologically produced 22R isomer, until equilibrium is reached, at which point the 22S isomer accounts for about 60% of the mixture. This is achieved soon after the onset of oil generation (at about 0.60% VR, before significant oil generation has occurred), limiting the use of this parameter at higher levels of maturity. In the extracts and condensates, the 22S isomer accounts for 55-59% of the mixture, implying that isomeric equilibrium has been reached, and that the source rocks in both cases were thermally matured at least to the point of initial oil-generation. Note that the 22S isomer of the C_{32} hopanes forms 55-60% of the isomeric mixture, concurring with the C_{31} hopane data.

C_{28} 25,30 and 28,30-bisnorhopanes (BNH) are present in the extracts (Tables 14-1 to 18-1, and Figures 29-33), but are not reported for the condensates. While high concentrations of BNH are typical of petroleum from highly reducing to anoxic depositional environments (Peters and Moldowan, 1993), its presence in the La Bella-1 extracts is more likely the

result of its derivation from the original (post-digenetic) free bitumen (S_0) in the source claystones. Concentrations of BNH from such a source are likely to fall during thermal maturation, which may explain the absence of BNH in the more mature condensates.

3.4.2 Sterane Parameters

The relative proportion of the geological 20S and biological 20R isomers of the C_{28} and $C_{29}\alpha\alpha\alpha$ (normal) steranes, expressed as the 20S/20S+20R ratios, is perhaps the most reliable biomarker maturity parameter (it is not greatly influenced by lithofacies variations). Equilibrium, when the 20S isomer forms about 52-55% of the mixture, is reached at, or around, 0.80% vitrinite reflectance. In the La-Bella-1 condensates the 20S isomer forms 51-53% of the C_{29} mixture, suggesting expulsion of the oil from its source sediment at, or beyond, 0.80% vitrinite reflectance, in contrast to the extracts in which the 20S isomer forms only 27-38% of the C_{29} mixture (reflecting their relative immaturity).

The relative proportions of C_{29} normal ($\alpha\alpha\alpha$) and iso- ($\beta\beta\alpha$) steranes can be effective in assessing the thermal maturity of source rocks and oils. The normal ($\alpha\alpha\alpha$) steranes, produced biologically, become less dominant relative to the iso-steranes ($\beta\beta\alpha$) with increasing maturity, until equilibrium is reached at a value of $\beta\beta\alpha/(\beta\beta\alpha+\alpha\alpha\alpha)$ of about 67-71% (VR=0.90%). In the La Bella-1 condensates, the iso-steranes dominate the normal steranes ($\beta\beta\alpha/\alpha\alpha\alpha+\beta\beta\alpha = 58-60\%$), suggesting that the source rock was matured to 0.8-0.9% VR at the time they were expelled. The lower values of 37-40% in the extracts is a further reflection of their relative immaturity.

Diasterane/sterane ratios are affected by both thermal maturity and inorganic (lithological) characteristics of the source rock. Conversion of steranes to diasteranes is catalysed by clay minerals, so that diasterane/sterane ratios are typically low (less than 0.30) in carbonate source rocks and derived oils. A high-Eh (oxidising) depositional environment and increasing thermal maturity can each result in a high diasterane/sterane ratio. C_{29} diasteranes constitute 36-41% of the C_{29} normal/iso-/diasterane mixture in the La Bella-1 condensates, compared with 22-28% in the extracts, further reflecting the greater maturity of the condensates. It is difficult to make a better estimate of the absolute level of thermal maturity at which the condensates and extracts were expelled from their respective sources (the proportion of diasteranes in the extracts being partly dependent on lithofacies).

The general assumption about triterpane/sterane ratios is that steranes are derived mainly from algae and higher plants, whereas triterpanes come mainly from bacteria. However, the relationship between organic facies and triterpane/sterane ratio is complex, and cannot always be used with

confidence. When absolute concentrations of biomarkers are high, high triterpane/sterane ratios are taken to indicate a high degree of microbial input; where concentrations are low, high ratios are taken to indicate greater contribution from land-plants than from algae. Low triterpane/sterane ratios together with high absolute biomarker concentrations, are associated with coals, shales and oils (eg. South East Asia and New Zealand); low ratios in conjunction with low absolute abundances may indicate a dominance of higher-plant and fungal material (Waples et al., 1991). Triterpane/sterane ratios as expressed by Ratio C in Figures 41b, 42b and 44b are low in the La Bella-1 condensates (0.34-0.62), and higher in the extracts (2.5-3.5), suggesting a dominance of higher land-plant material in the source sediments of the extracts.

Figures 43a and 43b, triangular plots of C_{27} , C_{28} and C_{29} normal steranes, show a dominance of C_{27} compounds, the data plotting within the marginal marine field. Note that S isomers of the normal steranes were reported for four of the extracts, and neither of the condensates, so that Figures 43a and 43b are constructed accordingly.

Figure 44a shows a crossplot of Pr/Ph ratios versus $C_{29}R/C_{27}R$ sterane ratios for the condensates and extracts, confirming the relatively oxic environment of deposition of the source sediments, but again reflecting lower-than-expected values for the sterane ratio.

Plots of $\beta\beta/(\beta\beta + \alpha\alpha)$ versus $20S/(20S + 20R)$ for the C_{29} steranes are effective in describing and comparing the thermal maturity of source rocks or oils; data for any oils which plot away from the maturity trend-line in such plots should be re-examined in the light of the disagreement between the two parameters (Peters and Moldowan, 1993). As Figure 45 shows, data for the condensates plot together, high on a maturity trend-line which passes close to the 2097.7m extract to the origin; the other extract data, while confirming the relative immaturity of the extracts, are somewhat scattered (notably the 2070m and 2100-2110m samples), though this, in the light of the extract yield data, may be as much a function of analytical error and/or poor sample quality as true geochemical character.

A note of caution should be made regarding the use of biomarker data from condensates. Condensates are formed either from source rocks under high thermal stress or by phase-separation from an oil, and exist in the subsurface in the gas phase. These processes usually result in a significant variation in the values of important biomarker ratios and parameters in condensates compared with co-genetic oils. Although it is possible to compensate for the effect of maturity by selecting parameters which are relatively insensitive to maturity, it is very difficult to compensate for

phase-change effects (Woodhouse, 1991). However, the biomarker data for the La Bella-1 condensates, notwithstanding these effects, differ from the biomarker data from the extracts to such a degree that it is unlikely that the two sets of fluids are co-genetic.

3.5 GC-MS(Aromatics) Analysis

The aromatics fractions from the 2072.8m and 2160.5m condensates from La Bella-1, together with those from five extracts, were analysed by the SIR GC-MS technique. Full suites of mass fragmentograms are provided in this report as Appendices 2 and 4. Detailed compound abundances, and parameters calculated from them, are listed in Tables 19-25.

The primary application of these data is for maturity assessment. Perhaps the most widely used parameter is the Methylphenanthrene Index (MPI-1), due to its better calibration against the vitrinite reflectance scale, equivalent values of which can be calculated (Radke et al, 1982). Figure 46a shows a plot of MPI-derived vitrinite reflectance values, $R_c(a)\%$, versus depth for the La Bella-1 condensates and extracts. The condensates give disparate values, the 2160m value (0.96%) being considered the more reliable in the context of other parameters. The extracts give values in the 0.71-0.80% early mature range; however, if MPI-1 values are converted according to a formula more consistent with Australian coals (Boreham et al, 1988), the $R_c(a)$ values fall within the 0.58-0.69% marginally mature range (Figure 46b), consistent with the measured vitrinite reflectance values over the same depth interval (see Figure 10). Note that this approach has the concomitant effect of reducing the $R_c(a)$ values for the condensates to maturity levels inconsistent with other observations (see Gas Analysis Data).

Maturity estimates based on the TNR-1 (Trimethylnaphthalene Ratio) lie in the marginal-to-early mature range in the extracts (consistent with the MPI-1 and other data), and also in the condensates (inconsistent with other data). The MPR-1 (methylphenanthrene ratio) parameter gives a late-oil mature estimate for the condensates and extracts alike (inconsistent with other maturity estimates for the extracts).

The relative abundances of certain aromatic compounds can be applied to source input assessment, particularly the degraded diterpanes, such as 1,2,5-TMN, 1,7-DMP, 1-MP and retene, which are thought to be derived from resin precursors in conifers (such as Araucariaceae, Cupressaceae and Podocarpaceae in the Jurassic to Lower Cretaceous of Australia). Source sediments which pre-date the appearance of such conifers in the Late Triassic will display different distributions of degraded aromatic compounds, so that the data provide a useful correlation tool. Figures 47a

and 47b show crossplots of ratios involving these compounds, and show separate groupings of the condensates and extracts, implying different sources. This is consistent with the earlier inference that the extracts are indigenous to their depth interval, whereas the condensates represent migrated fluids.

3.6 Gas Analysis

Two gas samples, recovered by RFT from 2072.8m and 2160.5m in La Bella-1 were analysed by CSIRO, North Ryde for their chemical and stable carbon isotopic compositions. (Condensates isolated by cold-trapping these gases were analysed separately, the results of this work having already been discussed.)

3.6.1 Chemical Composition

The chemical compositions of the RFT gases are summarised in Tables 26 and 27, normalised in Figure 48a, and compared in Figure 48b. As expected, the gases are chemically very similar, containing 76-77% methane and 4.5-4.8% ethane by volume, together with 12-13% carbon-dioxide and 3.4-3.9% nitrogen.

3.6.2 Stable Carbon Isotopic Composition

The stable carbon isotope data for the two gases are listed in Table 28, and values for individual hydrocarbon species cross-plotted in Figures 49a and 49b. As these figures show, the carbon isotope compositions of the gases are very similar, leaving their co-genetic origin in little doubt. In addition, these figures indicate that the gases were expelled from their source rocks at thermal maturities equivalent to about 1.30-1.35% VR, early in the wet-gas-generative window.

Figure 50 is an attempt to characterise the gases in terms of the isotopic compositions of their methane components and the relative amounts of their C₂+ components. This plot suggests that the gases are non-associated (ie. they were not generated along with oil, but produced by the thermal cracking of oils) and that they were migrated from moderate depth. The plot also infers that their source may have been marine rather than humic.

4

CONCLUSIONS

Nine SWC samples, from the Late Cretaceous Sherbrook and Shipwreck Groups, were analysed for their TOC content. All these samples yielded values greater than 1.0%, and were accordingly analysed by Rock-Eval pyrolysis. A core sample from 2095.15-2095.20m was similarly analysed. The resulting data revealed a predominance of Type II/III to Type III, mainly gas/condensate-prone organic matter with HI values less than 200, with the exception of one coal sample (2540.5m) characterised by a more strongly Type II, liquids-prone organic facies. While liptinitic/exinitic (Type II) macerals were identified in most samples (supplemented by a sparse alginitic component in the Sherbrook Group), suggesting some liquids potential, it is clear from the S1+S2 yields that expulsion from these samples would be possible only at relatively advanced levels of thermal maturity; at such levels, secondary cracking of liquids to gas would occur, such that these source rocks would, in the event, become more gas-prone than indicated by the source character data.

Thermal maturity data, namely Tmax, PI and vitrinite reflectance measurements, suggest that the Sherbrook Group is thermally immature and the Shipwreck Group marginally mature. The generative potential of the source rocks discussed above has therefore not been realised at the La Bella-1 location. A further inference is that the quality of these source rocks can in no way be linked to advanced maturity, their relative leanness being more a function of the preservation state of their contained organic matter.

A trace of hydrocarbon was reported during petrographic analysis of the 2095.15-2095.20m core sample. The sample was therefore solvent-extracted to determine the character of any contained hydrocarbons. A further seven samples (two core fragments, four SWCs, and one cuttings sample), from four separate reservoir units and one intra-formational claystone, were solvent-extracted in an attempt to identify any residual hydrocarbons (namely, any hydrocarbons which represent the remains of an earlier saturation displaced by the existing gas accumulation).

The resulting extract yields were low (less than 800ppm). Each was analysed by the whole-extract GC method, and the nature of the GC traces, taken together with the low extract yields, did not offer any strong indication that the extracts represented residual hydrocarbon saturations. However, to be certain of this, five of the extracts were subjected to more detailed analysis, namely saturate-GC, GC-MS (branched/cyclics) and GC-MS (aromatics). Two condensates, acquired from the cold-trapping of the 2072.8m and 2160.5m RFT gases, were subjected to the same analytical sequence to determine any similarity between the compositions of the extracts and those of known migrated fluids.

The condensates and extracts alike revealed Pr/Ph ratios, and ratios of Pr/nC₁₇ to Ph/nC₁₈, typical of land-plant derived organic matter in sediments deposited under relatively oxic conditions. However, the saturate-GC traces of the extracts showed significant variation. Three of the extracts contained high molecular-weight, odd-preferenced, waxy components within their alkane distributions (consistent with derivation from land-plants), while in a fourth only a subtle waxy hump was evident; the fifth showed a symmetrical hump of unresolved compounds typical of contamination.

The characters of the saturates-GC traces of the extracts compared with those of the condensates support the view that the extracts do not represent thermally mature, migrated hydrocarbons. GC-MS analysis of the branched/cyclic alkanes revealed fundamental differences in the biomarker distributions of the extracts and condensates which appear to be due more to differences in maturity than to differences in organic facies (though these may exist). In particular, C₂₈-bisnorhopanes, thought to be derived from post-diagenetic free bitumens in thermally immature claystones, are present in the extracts but not the condensates. Maturity estimates based on MPI-1 values from GC-MS analysis of the aromatic fractions of the extracts appear to concur with other maturity indicators from the interval, indicating the marginal maturity of the Shipwreck Group.

The analytical data, taken together, therefore suggest that the La Bella-1 extracts do not represent a residuum of thermally mature migrated fluids, but are instead indigenous to, or very locally migrated within, the marginally mature Shipwreck Group.

Two gas samples were recovered by RFT from 2072.8m and 2160.5m, consisting of 76-77% methane, 4.5-4.8% ethane, 12-13% carbon-dioxide, and 3.4-3.9% nitrogen. Interpretation of stable carbon isotope data from the gases suggests that they were expelled from their source rocks at thermal maturities equivalent to about 1.30-1.35% VR, early in the wet-gas-generative window, having been generated by the thermal cracking of liquids rather than in association with them.

REFERENCES

BOREHAM, C.J., CRICK, I.H., and POWELL, T.G., 1988, "Alternative Calibration of the Methylphenanthrene Index Against Vitrinite Reflectance: Application to Maturity Measurements on Oils and Sediments" Org. Geochem., 12, 289-294.

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WAPLES, D.W., and MACHIARA, T., 1991, "Biomarkers for Geologists : A Practical Guide to the Application of Steranes and Triterpanes in Petroleum Geology" (AAPG Methods in Exploration, No. 9, 91pp).

TABLE 1-1

GEOLOGIC & GENERAL DATA - SEDIMENTS

=====

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH 1	DEPTH 2	GEOLOGIC PERIOD/EPOCH	GEOLOGIC AGE	FORMATION	PRIMARY LITHOLOGY	PERCENT PRIMARY	SECONDARY LITHOLOGY	PERCENT SECONDARY	SAMPLE TYPE	SAMP QUAL
1563.00	1563.00	L.CRET	-	SHERGP	-	-	-	-	SWC	-
1692.00	1692.00	L.CRET	-	SHERGP	-	-	-	-	SWC	-
1865.00	1865.00	L.CRET	-	SHERGP	-	-	-	-	SWC	-
1979.00	1979.00	L.CRET	-	SHERGP	-	-	-	-	SWC	-
2070.00	2070.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2071.20	2071.20	L.CRET	-	SHIPGP	-	-	-	-	COR	-
2095.15	2095.20	L.CRET	-	SHIPGP	-	-	-	-	COR	-
2097.70	2097.70	L.CRET	-	SHIPGP	-	-	-	-	COR	-
2100.00	2110.00	L.CRET	-	SHIPGP	-	-	-	-	CUT	-
2102.50	2102.50	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2121.00	2121.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2159.00	2159.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2232.00	2232.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2309.00	2309.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2454.00	2454.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2528.00	2528.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2540.50	2540.50	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
2646.50	2646.50	L.CRET	-	SHIPGP	-	-	-	-	SWC	-

N.B. Code definitions at end of table

- = No data

CODE DEFINITIONS FOR TABLE 1

GEOLOGICAL PERIOD CODES

L.CRET = Late Cretaceous

GEOLOGICAL AGE CODES

FORMATION CODES

SHERGP = Sherbrook Group
SHIPGP = Shipwreck Group

SAMPLE TYPE CODES

COR = Conventional Core
CUT = Cuttings
SWC = Sidewall Core

SAMPLE QUALITY CODES

CONTRAI

GTS = Geote

TABLE 1-2

GEOLOGIC & GENERAL DATA - FLUIDS

=====

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH 1	DEPTH 2	SAMPLE DESCRIPTION	GEOLOGIC PERIOD/EPOCH	GEOLOGIC AGE	FORMATION	SAMPLE TYPE	SAMPLE
2072.80	2072.80	GAS	L.CRET	-	SHIPGP	GAS	
2072.80	2072.80	RFT SAMPLE	L.CRET	-	SHIPGP	CON	
2160.50	2160.50	GAS	L.CRET	-	SHIPGP	GAS	
2160.50	2160.50	RFT SAMPLE	L.CRET	-	SHIPGP	CON	

 N.B. Code definitions at end of table
 - = No data

CODE DEFINITIONS FOR TABLE 1

GEOLOGICAL PERIOD CODES

L.CRET = Late Cretaceous

GEOLOGICAL AGE CODES

FORMATION CODES

SHIPGP = Shipwreck Group

SAMPLE TYPE CODES

CON = Condensate
GAS = Gas

SAMPLE QUALITY CODES

CONTRACTOR CODES

CSI = C.S.I.R.O
GTS = Geotechnical Services

TABLE 2

TOC AND ROCK-EVAL PYROLYSIS DATA - SEDIMENTS

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH 1	DEPTH 2	TOC	TMAX	S0	S1	S2	S3	S1+S2	S2/S3	PI	PC	HI	OI
1563.00	1563.00	1.90	423	-	.73	2.82	.33	3.55	8.55	.21	.29	148	1
1692.00	1692.00	1.50	424	-	.50	2.21	.28	2.71	7.89	.18	.22	147	1
1865.00	1865.00	1.55	433	-	.30	1.85	.57	2.15	3.25	.14	.18	119	3
1979.00	1979.00	1.45	438	-	.23	1.56	.63	1.79	2.48	.13	.15	108	4
2095.15	2095.20	2.05	440	-	.18	1.92	.77	2.10	2.49	.09	.17	94	3
2232.00	2232.00	1.25	449	-	.18	1.90	2.01	2.08	.95	.09	.17	152	16
2309.00	2309.00	2.35	434	-	.31	4.30	3.27	4.61	1.31	.07	.38	183	13
2454.00	2454.00	1.60	440	-	.20	2.27	3.41	2.47	.67	.08	.21	142	21
2528.00	2528.00	1.10	440	-	.12	1.50	1.88	1.62	.80	.07	.13	136	17
2540.50	2540.50	73.30	428	-	7.00	188.97	2.61	195.97	72.40	.04	16.27	258	

TOC = Total organic carbon
 S2 = HC generating potential
 HI = Hydrogen index

TMAX = Max. temperature S2
 S3 = Organic carbon dioxide
 OI = Oxygen index

S0 = Volatile gaseous HC's
 PI = Production index
 - = no data

CODE DEFINITIONS FOR TABLE 2

INSTRUMENT CODES

RE2 = Rock-Eval II

SAMPLE TYPE CODES

COR = Conventional Core
CUT = Cuttings
SWC = Sidewall Core

CONTRACTOR CODES

GTS = Geotechnical Services

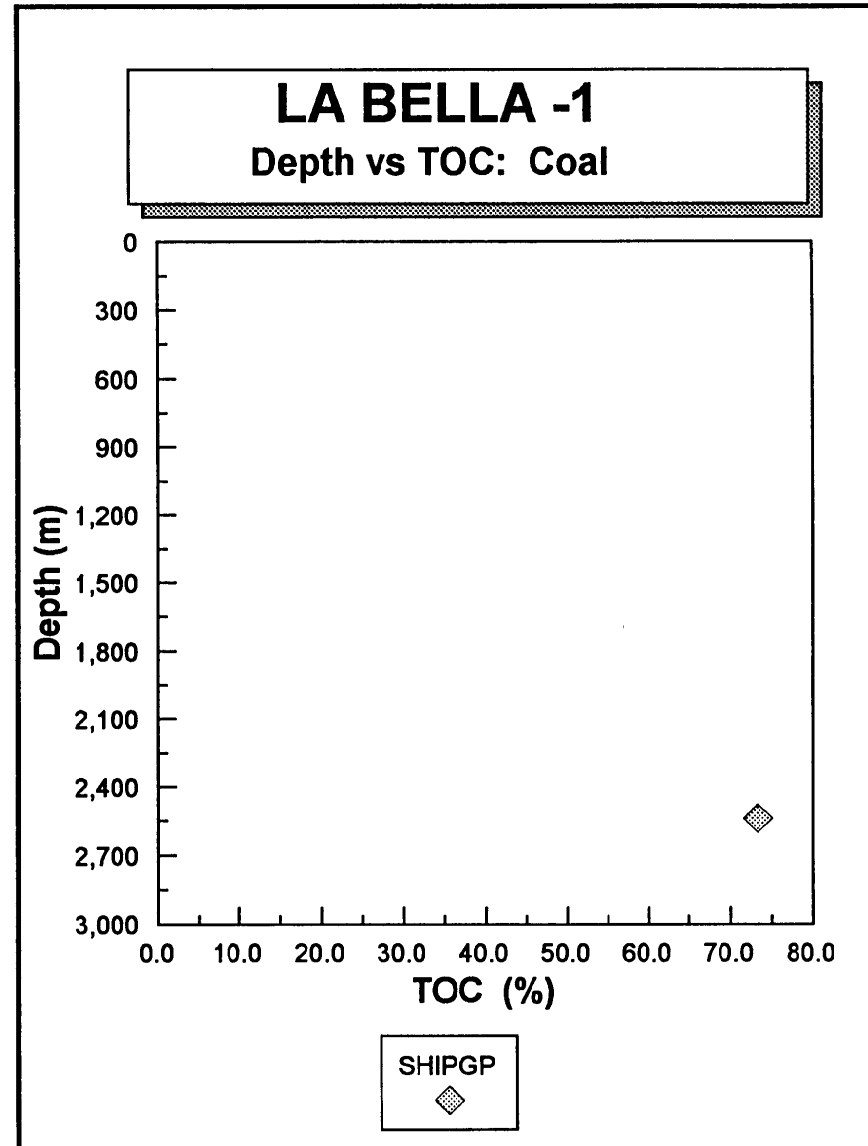
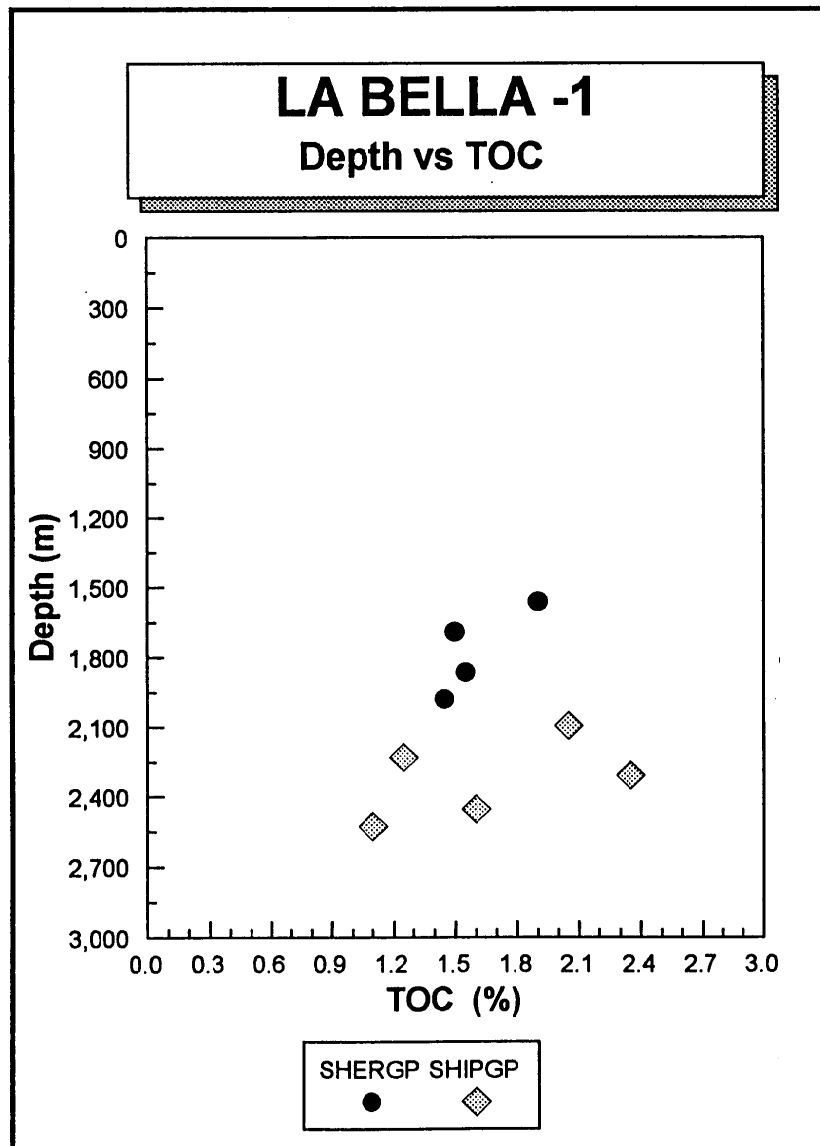


Figure 1

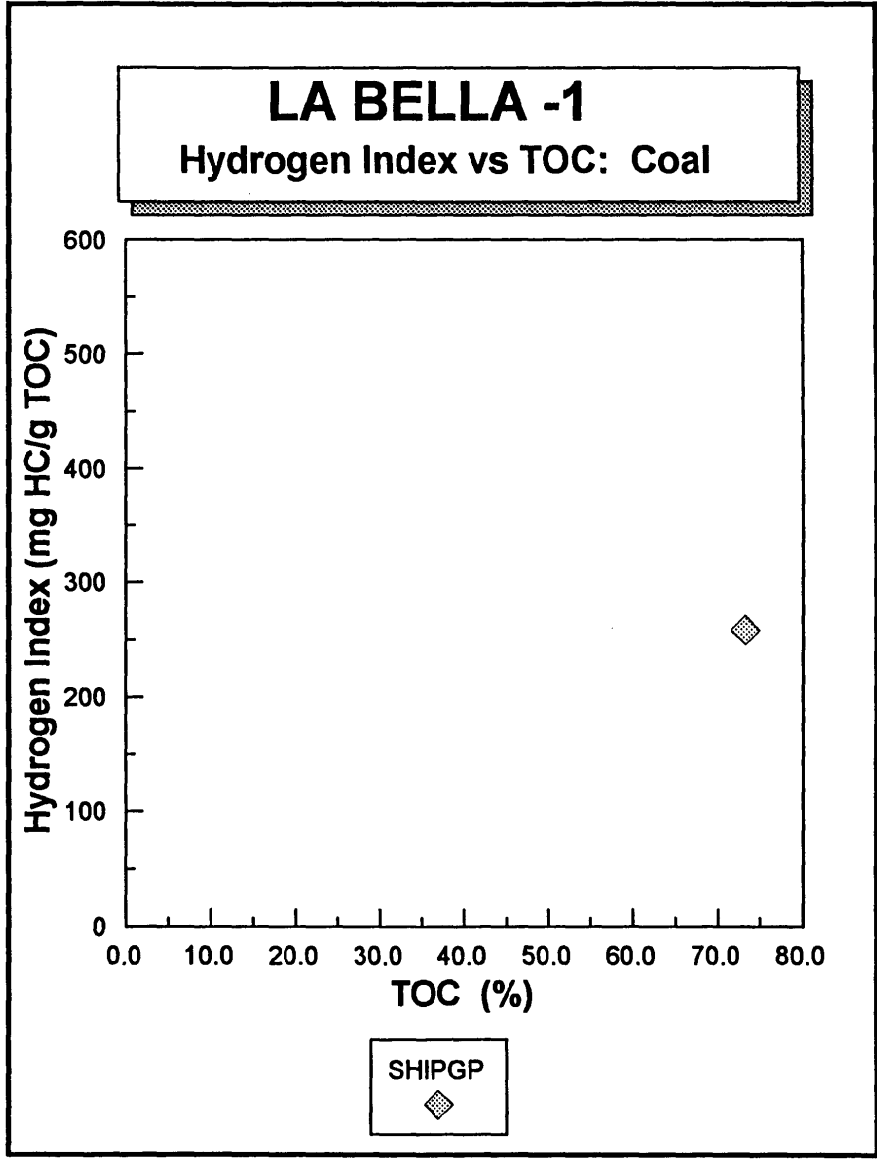
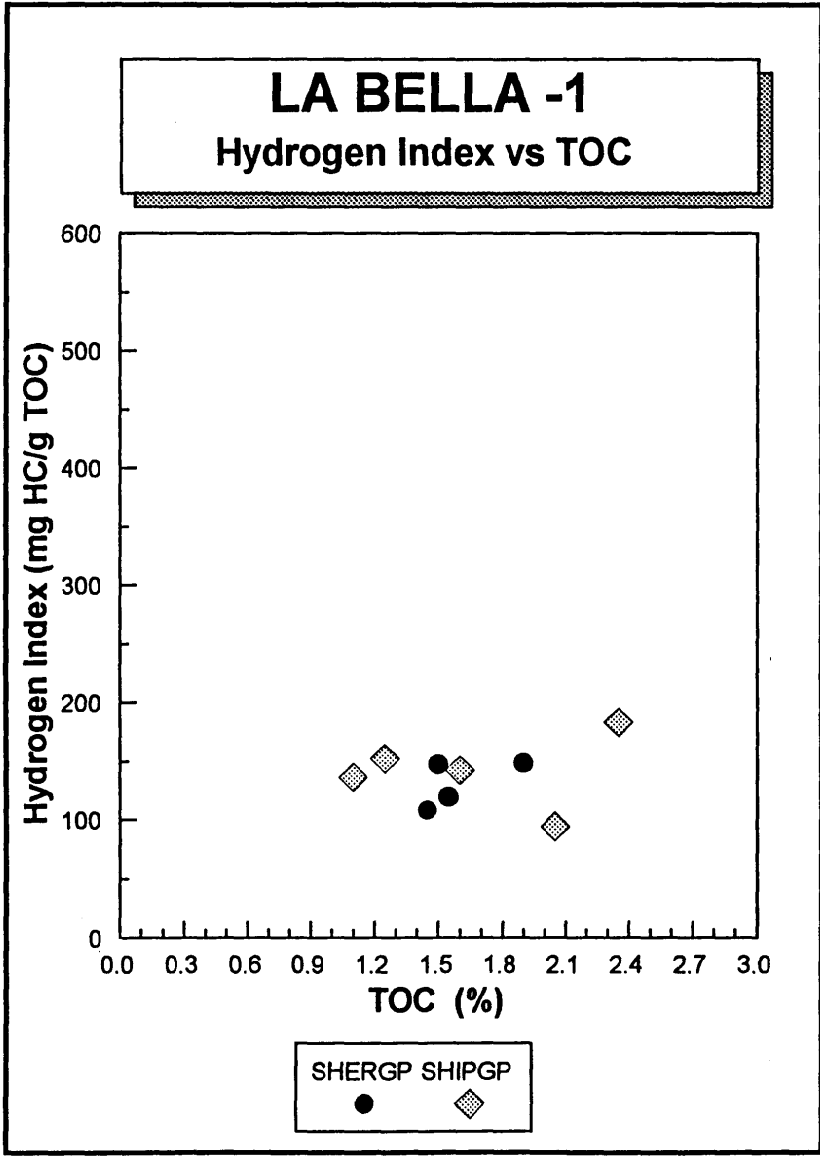


Figure 2

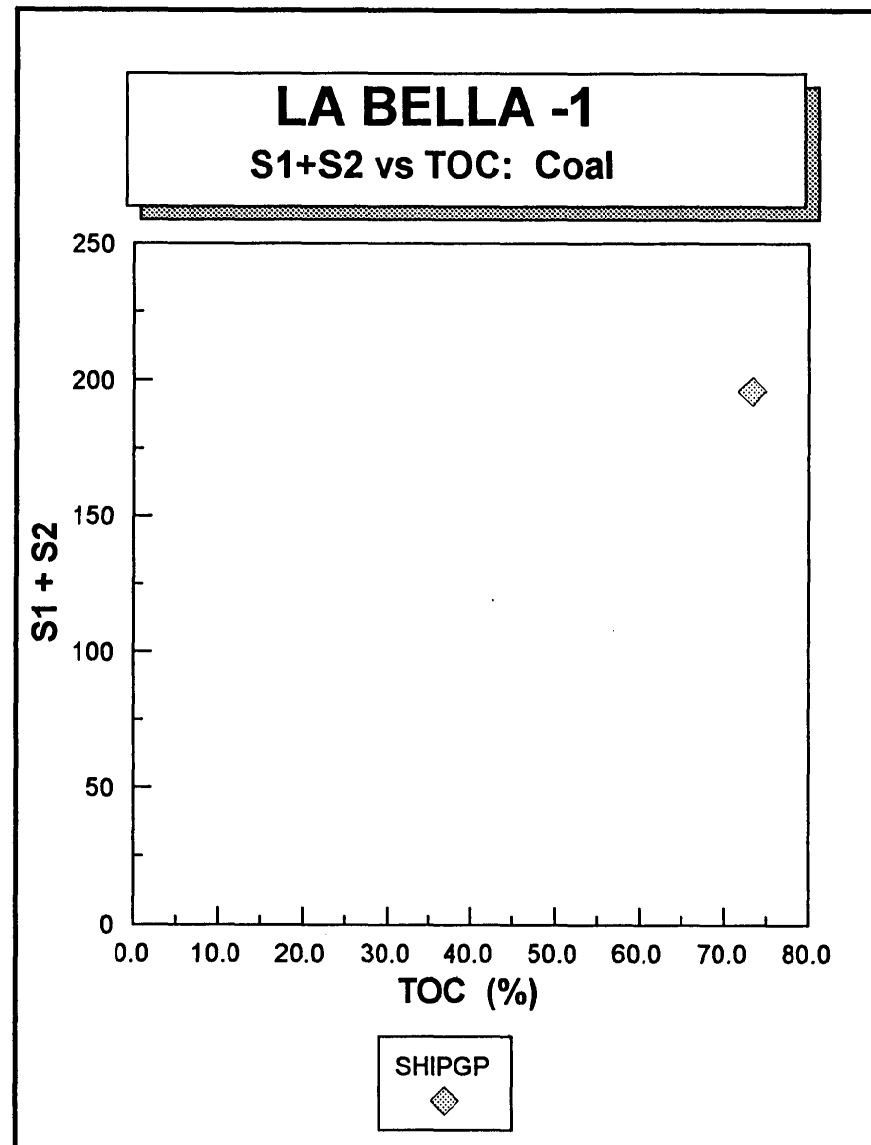
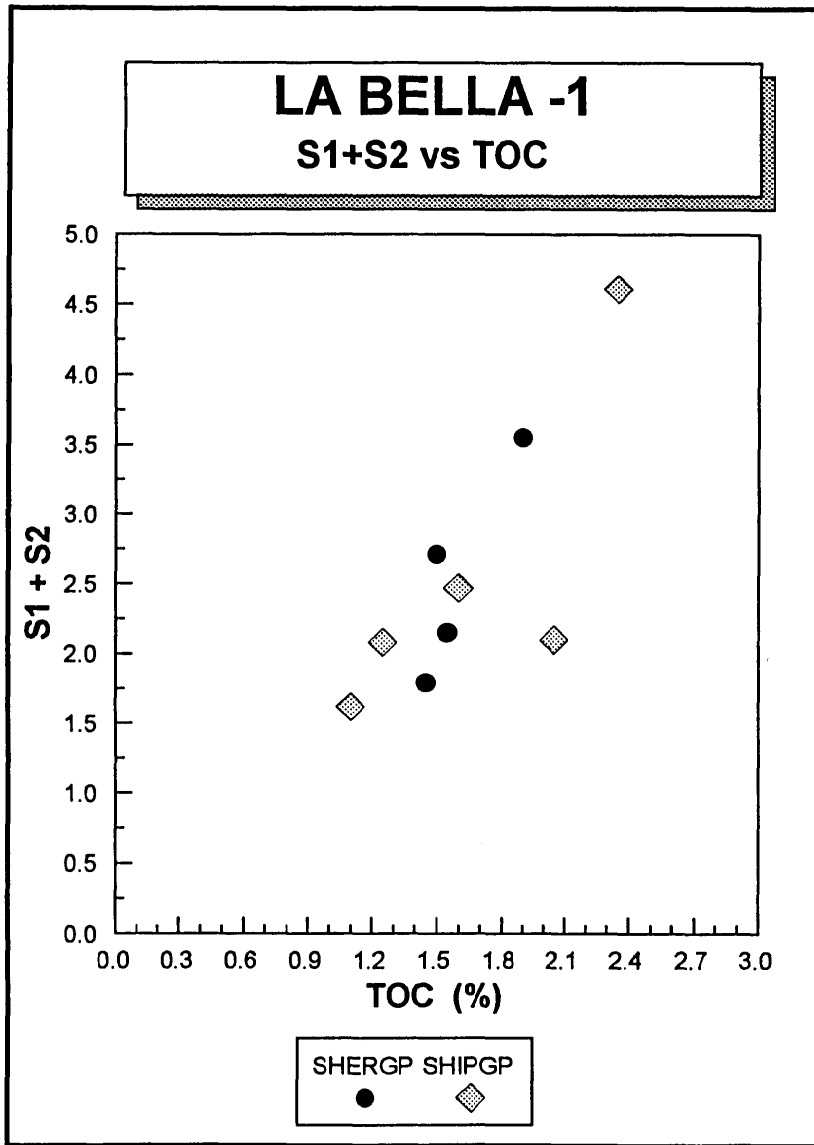
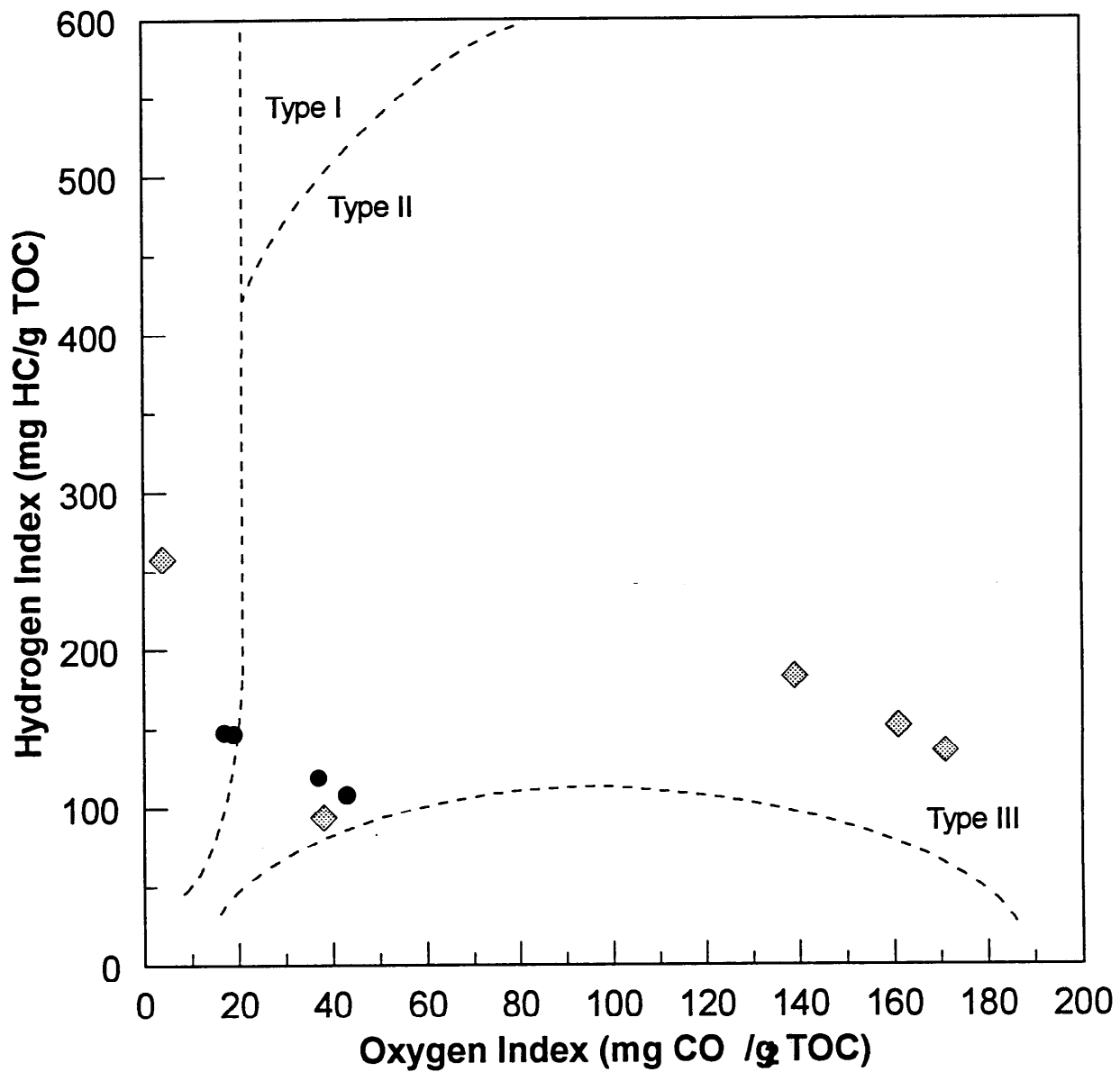


Figure 3

LA BELLA - 1

Hydrogen Index vs Oxygen Index



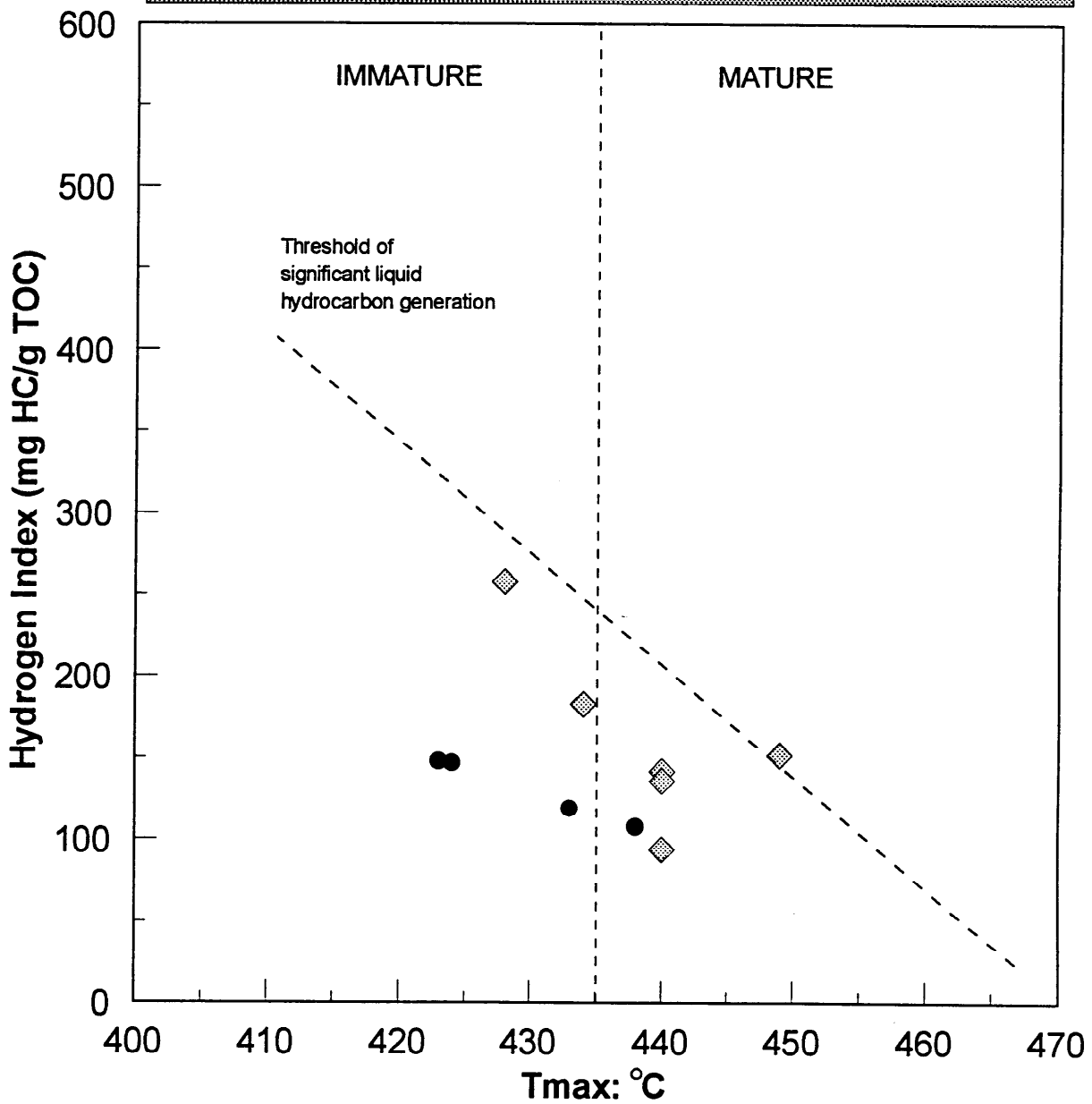
SHERGP SHIPGP



Figure 4

LA BELLA - 1

Hydrogen Index vs Tmax



SHERGP SHIPGP

● ◆

Figure 5

LA BELLA - 1

Maceral Composition Data

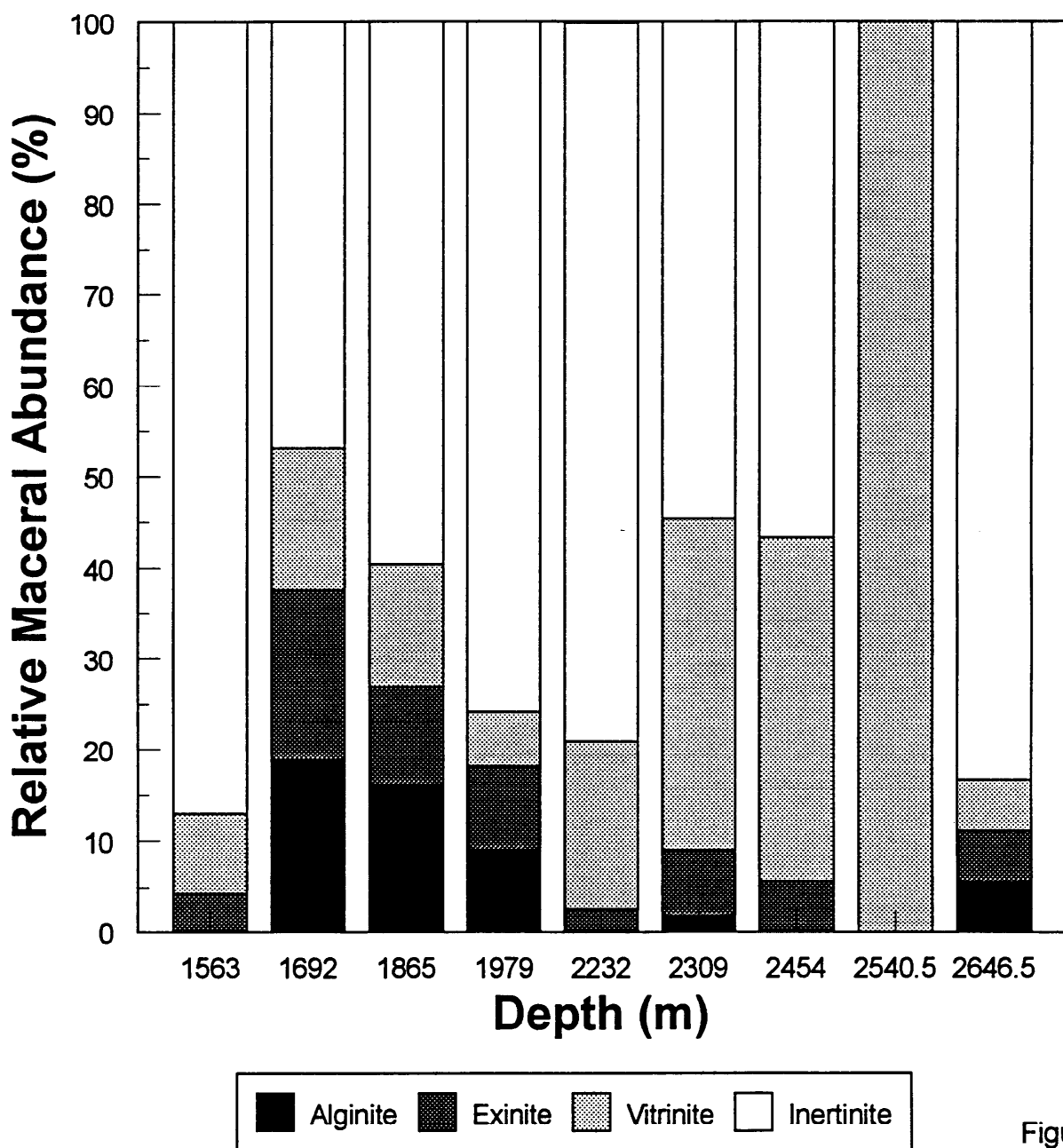
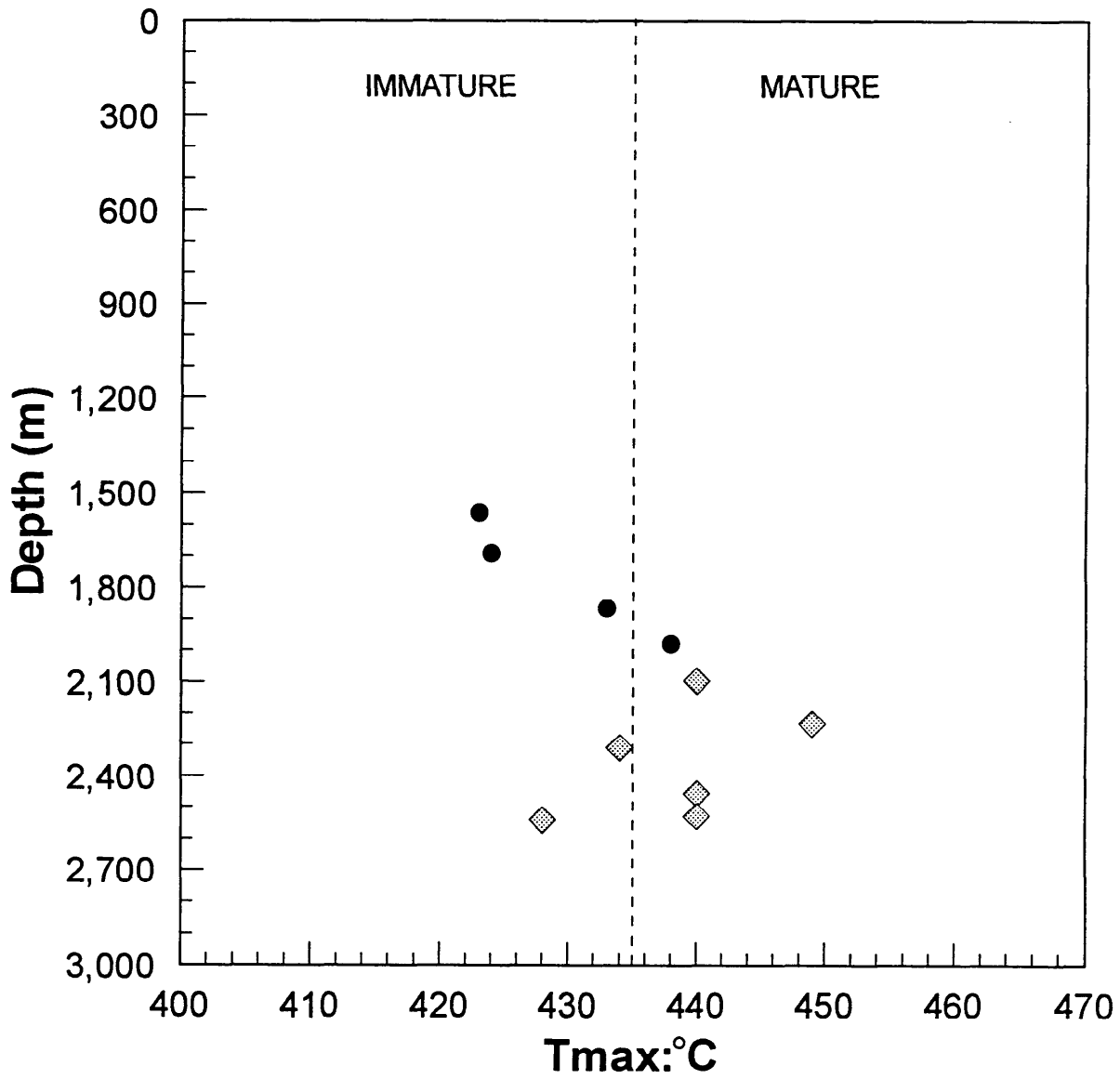


Figure 6

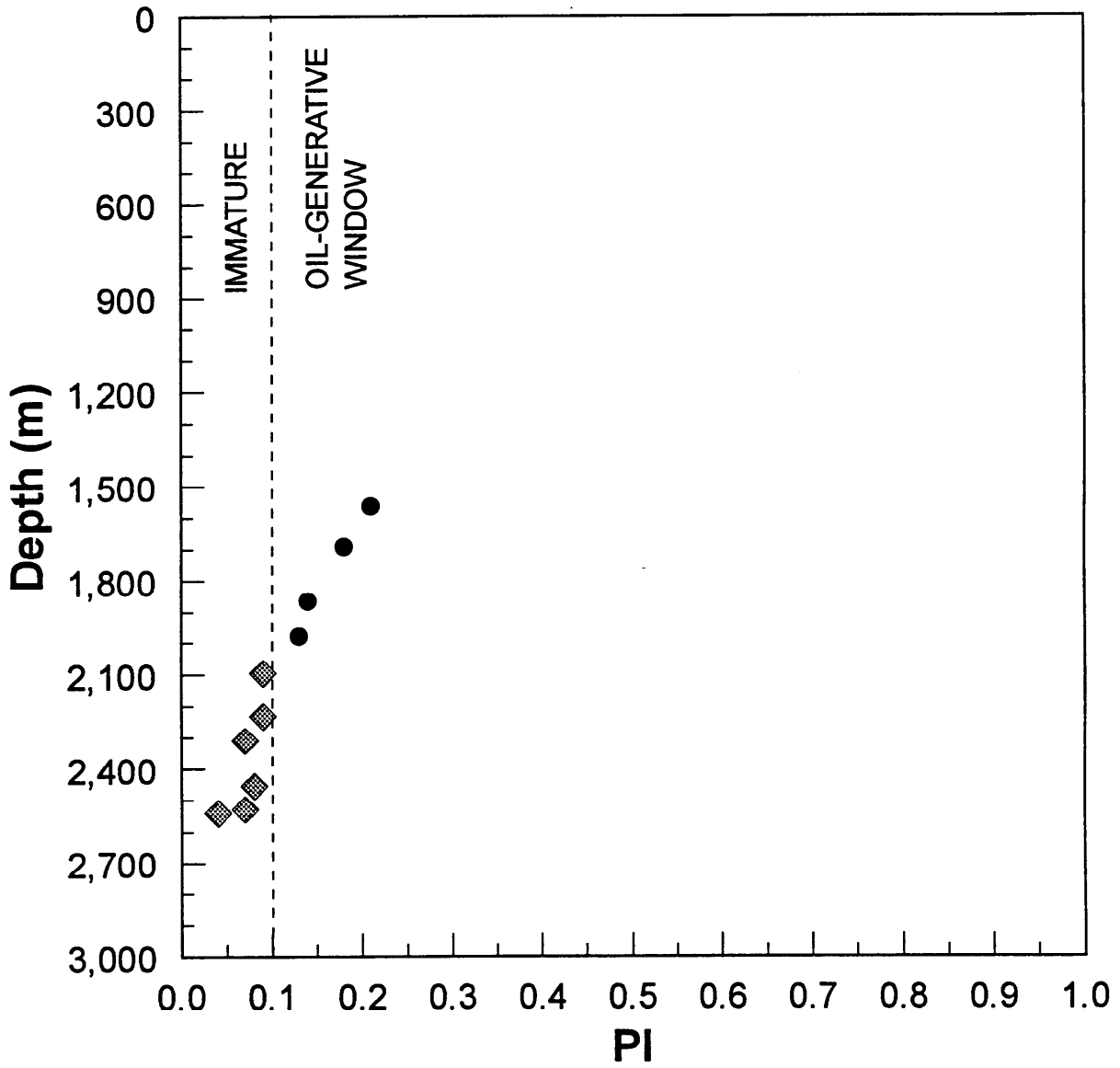
LA BELLA - 1 Tmax vs Depth



SHERGP SHIPGP
● ◆

Figure 7

LA BELLA - 1 PI vs Depth



SHERGP SHIPGP

● ◆

Figure 8

FIGURE 9

VITRINITE REFLECTANCE AND COAL MACERAL IDENTIFICATION

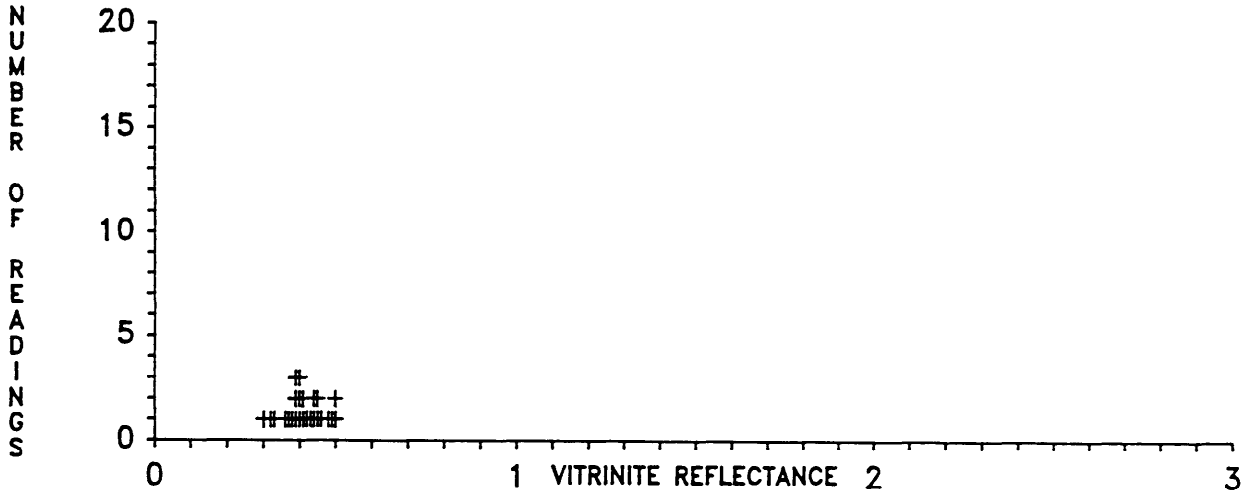
WELL: LA BELLA-1
 SAMPLE ID: 1563.0 METRES

CLIENT: BHP PETROLEUM
 DATE: MAY 1993

SAMPLE TYPE: SWC

(Total No. of Readings=25) 0.30 0.32 0.33 0.36 0.37 0.38 0.39 0.39 0.39 0.40 0.40 0.40 0.41 0.41 0.42 0.43 0.44
 0.44 0.45 0.45 0.46 0.48 0.49 0.50 0.50

VITRINITE REFLECTANCE							MACERAL IDENTIFICATION				
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	25	0.41	0.30	0.50	0.05	INDIGENOUS(+)	8.70	87.00	4.30	0.00



SAMPLE ID: 1692.0 METRES

SAMPLE TYPE: SWC

(Total No. of Readings=25) 0.42 0.43 0.44 0.45 0.47 0.47 0.48 0.50 0.50 0.51 0.52 0.52 0.52 0.52 0.53 0.53 0.53
 0.53 0.54 0.54 0.55 0.56 0.58 0.60 0.65

VITRINITE REFLECTANCE							MACERAL IDENTIFICATION				
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	25	0.52	0.42	0.65	0.05	INDIGENOUS(+)	15.20	45.50	36.40	2.90

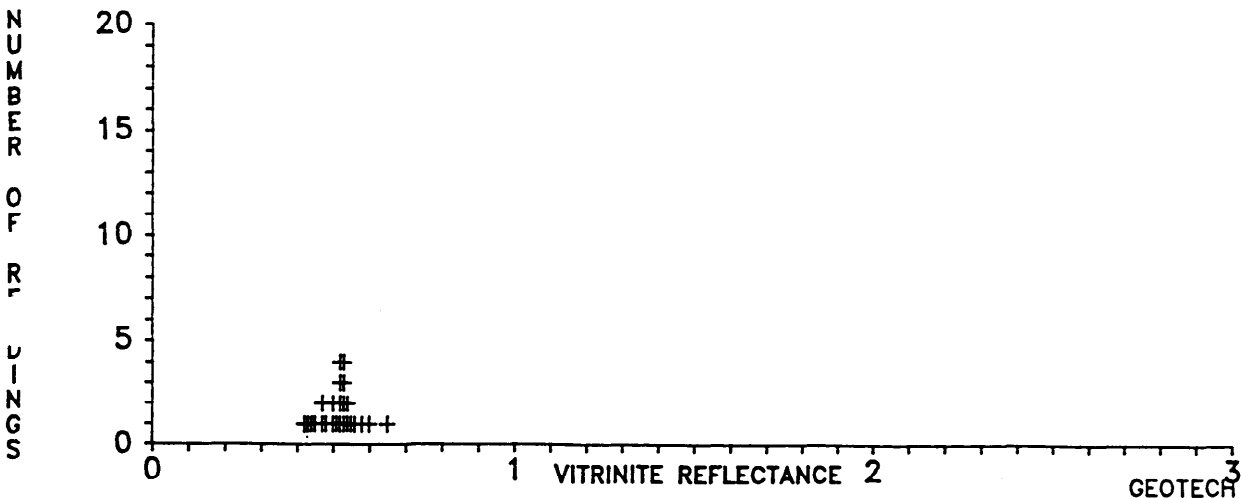


FIGURE 9 (contd)

VITRINITE REFLECTANCE AND COAL MACERAL IDENTIFICATION

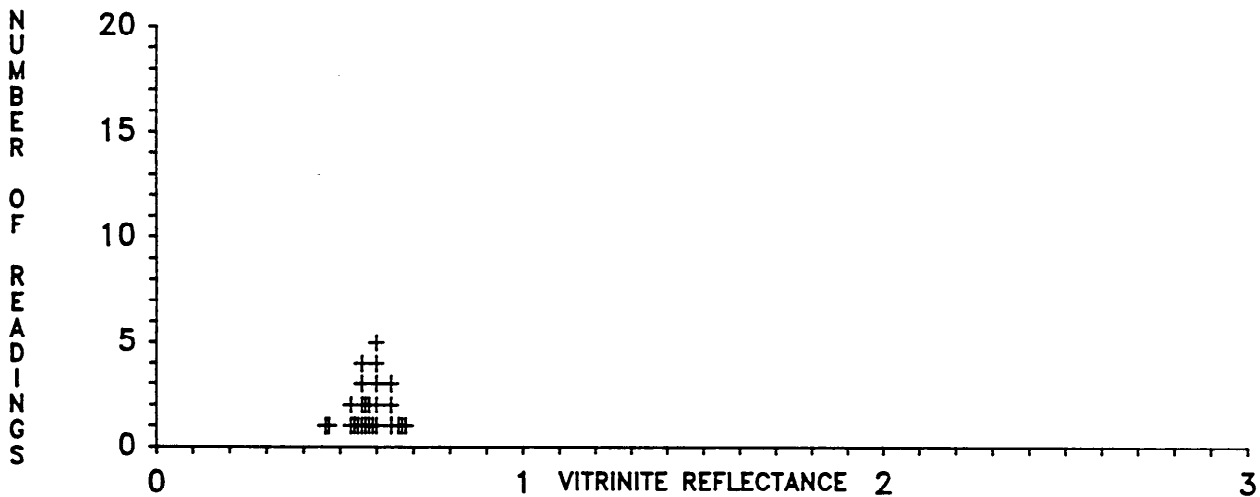
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 SAMPLE ID: 1865.0 METRES

CLIENT: BHP PETROLEUM
 DATE: MAY 1993

SAMPLE TYPE: SWC

(Total No. of Readings=26) 0.46 0.47 0.53 0.53 0.54 0.55 0.56 0.56 0.56 0.56 0.57 0.57 0.58 0.58 0.59 0.60 0.60
 0.60 0.60 0.60 0.64 0.64 0.64 0.66 0.67 0.68

VITRINITE REFLECTANCE							MACERAL IDENTIFICATION				
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	26	0.58	0.46	0.68	0.05	INDIGENOUS(+)	13.20	57.90	26.30	2.60



SAMPLE ID: 1979.0 METRES

SAMPLE TYPE: SWC

(Total No. of Readings=26) 0.56 0.59 0.60 0.60 0.60 0.61 0.61 0.62 0.63 0.65 0.68 0.68 0.68 0.68 0.68 0.69 0.69
 0.70 0.71 0.72 0.74 0.76 0.76 0.78 0.81 0.84

VITRINITE REFLECTANCE							MACERAL IDENTIFICATION				
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	26	0.68	0.56	0.84	0.07	INDIGENOUS(+)	5.90	73.60	17.60	2.90

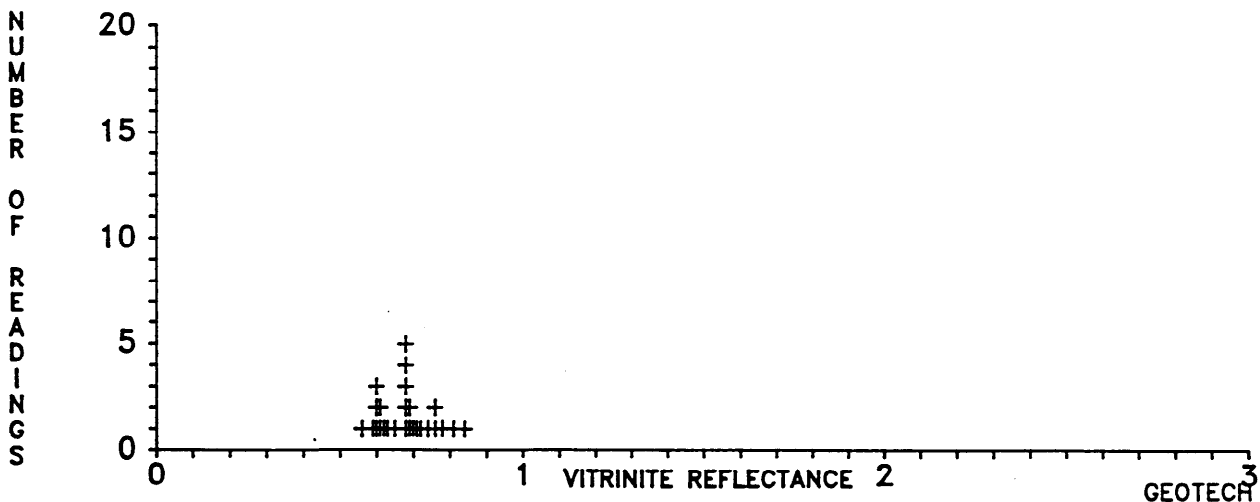


FIGURE 9 (contd)

VITRINITE REFLECTANCE AND COAL MACERAL IDENTIFICATION

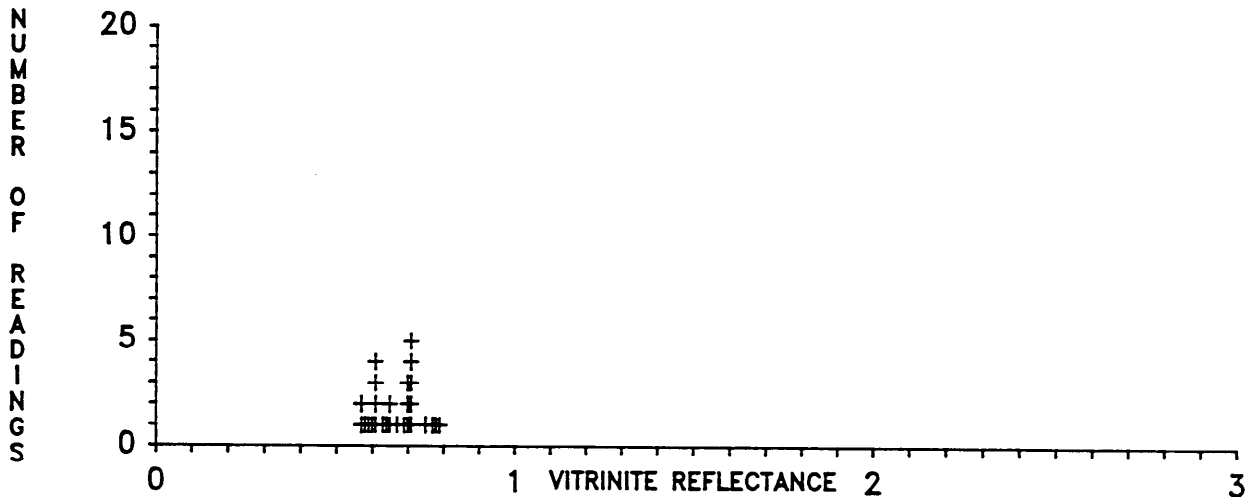
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 SAMPLE ID: 2232.0 METRES

CLIENT: BHP PETROLEUM
 DATE: MAY 1993

SAMPLE TYPE: SWC

(Total No. of Readings=27) 0.57 0.57 0.58 0.59 0.60 0.61 0.61 0.61 0.61 0.63 0.64 0.65 0.65 0.67 0.69 0.70 0.70
 0.70 0.71 0.71 0.71 0.71 0.71 0.71 0.75 0.77 0.78 0.79

VITRINITE REFLECTANCE							MACERAL IDENTIFICATION				
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	27	0.67	0.57	0.79	0.06	INDIGENOUS(+)	17.90	76.90	2.60	2.60



SAMPLE ID: 2309.0 METRES

SAMPLE TYPE: SWC

(Total No. of Readings=28) 0.52 0.54 0.55 0.55 0.58 0.58 0.58 0.59 0.60 0.60 0.60 0.60 0.60 0.61 0.61 0.61 0.61
 0.62 0.64 0.65 0.67 0.68 0.68 0.69 0.69 0.72 0.72 0.75

VITRINITE REFLECTANCE							MACERAL IDENTIFICATION				
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	28	0.62	0.52	0.75	0.06	INDIGENOUS(+)	35.70	53.60	8.90	1.80

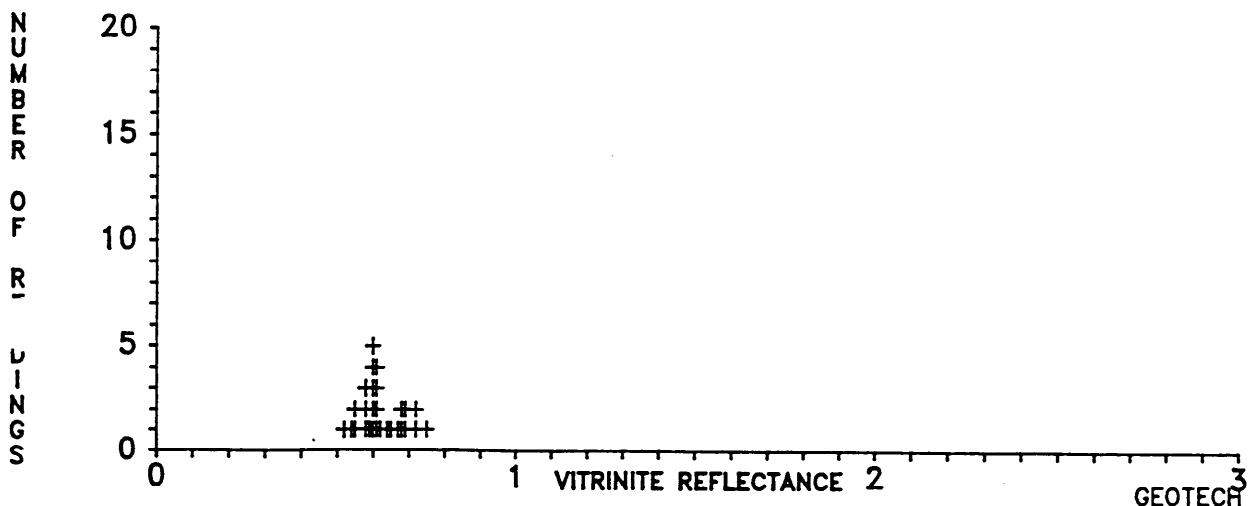


FIGURE 9 (contd)

VITRINITE REFLECTANCE AND COAL MACERAL IDENTIFICATION

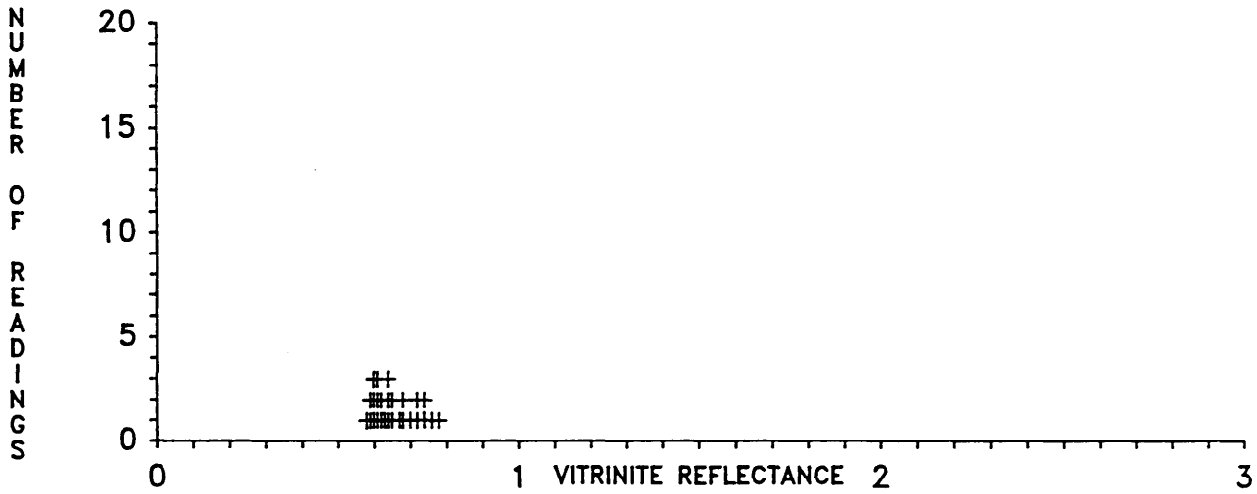
WELL: LA BELLA-1
 SAMPLE ID: 2454.0 METRES

CLIENT: BHP PETROLEUM
 DATE: MAY 1993

SAMPLE TYPE: SWC

(Total No. of Readings=27) 0.58 0.59 0.59 0.60 0.60 0.60 0.61 0.61 0.61 0.62 0.62 0.63 0.64 0.64 0.64 0.65 0.65
 0.67 0.68 0.68 0.70 0.72 0.72 0.74 0.74 0.76 0.78

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	27	0.65	0.58	0.78	0.06	INDIGENOUS(+)	37.70	56.60	5.70	0.00



SAMPLE ID: 2540.5 METRES

SAMPLE TYPE: SWC

(Total No. of Readings=27) 0.53 0.53 0.55 0.56 0.57 0.58 0.58 0.59 0.59 0.60 0.61 0.62 0.62 0.62 0.63 0.63 0.64
 0.64 0.65 0.65 0.65 0.66 0.66 0.67 0.68 0.71 0.72

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	27	0.62	0.53	0.72	0.05	INDIGENOUS(+)	99.90	0.10	0.00	0.00

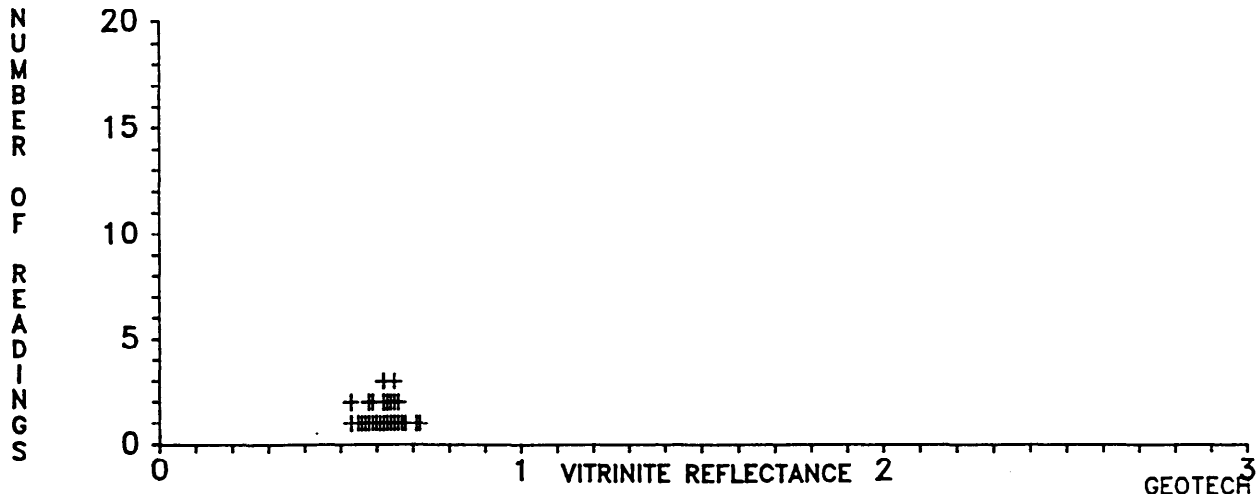


FIGURE 9 (contd)

VITRINITE REFLECTANCE AND COAL MACERAL IDENTIFICATION

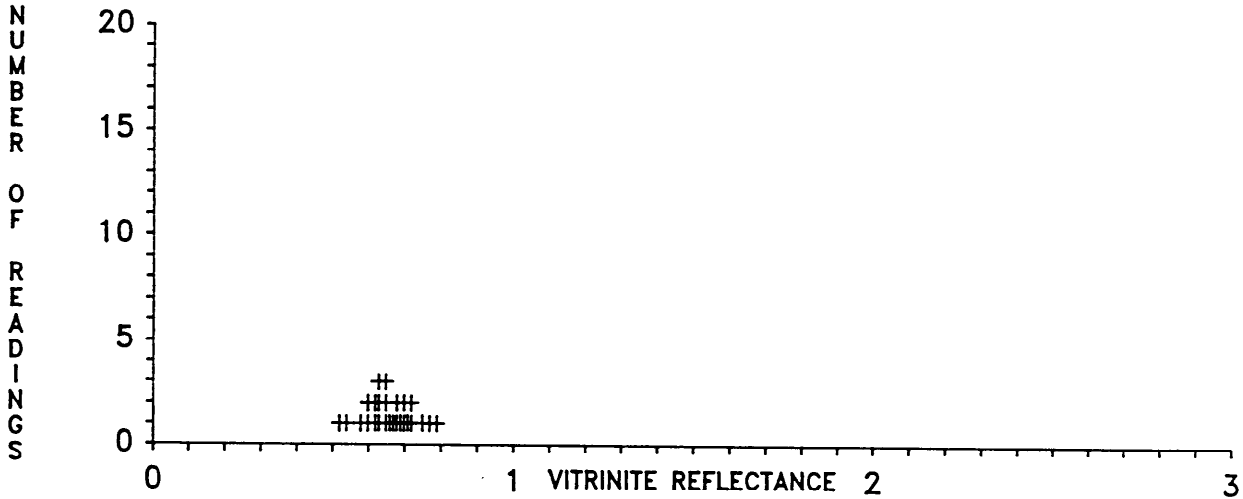
WELL: LA BELLA-1
 SAMPLE ID: 2646.5 METRES

CLIENT: BHP PETROLEUM
 DATE: MAY 1993

SAMPLE TYPE: SWC

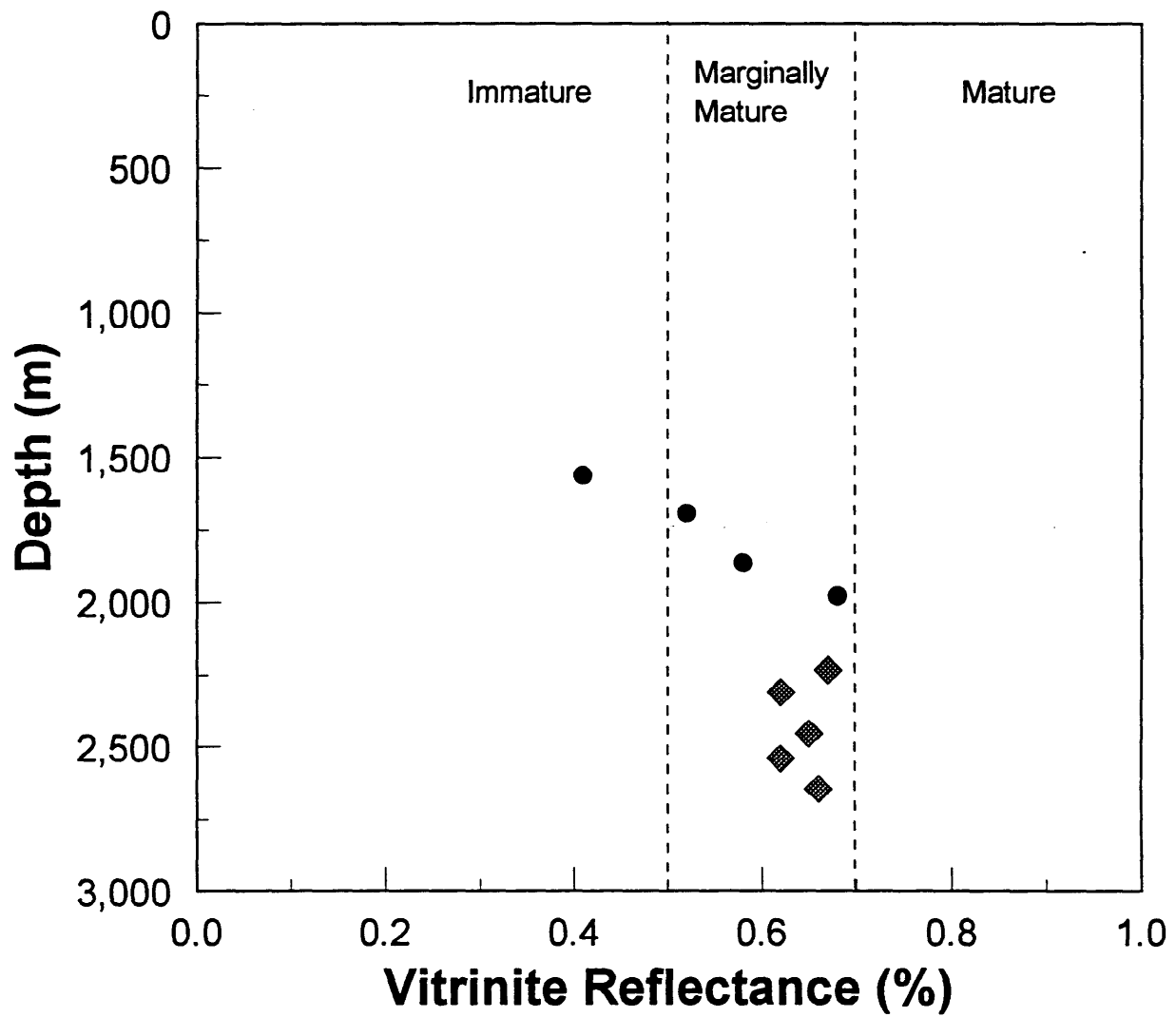
(Total No. of Readings=26) 0.52 0.54 0.58 0.60 0.60 0.62 0.62 0.63 0.63 0.63 0.65 0.65 0.65 0.66 0.67 0.68 0.68
 0.69 0.70 0.70 0.71 0.72 0.72 0.75 0.77 0.79

VITRINITE REFLECTANCE							MACERAL IDENTIFICATION				
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	26	0.66	0.52	0.79	0.06	INDIGENOUS(+)	5.30	79.00	10.50	5.20



LA BELLA - 1

Vitrinite Reflectance vs Depth



SHERGP SHIPGP

● ◆

Figure 10

TABLE 3

VITRINITE REFLECTANCE AND COAL MACERAL DATA - SEDIMENTS
ALL MACERAL POPULATIONS

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH 1	DEPTH 2	POPULATION TYPE	MEAN % REFL.	MINIMUM % REFL.	MAXIMUM % REFL.	NUMBER READINGS	STANDARD DEVIATION	-----MACERAL C % ALGINITE	% EXINITE
1563.00	1563.00	V	.41	.30	.50	25	.05	0.00	4.30
1692.00	1692.00	V	.52	.42	.65	25	.05	18.80	18.80
1865.00	1865.00	V	.58	.46	.68	26	.05	16.20	10.80
1979.00	1979.00	V	.68	.56	.84	26	.07	9.10	9.10
2232.00	2232.00	V	.67	.57	.79	27	.07	0.00	2.60
2309.00	2309.00	V	.62	.52	.75	28	.06	1.80	7.30
2454.00	2454.00	V	.65	.58	.78	27	.06	0.00	5.70
2540.50	2540.50	V	.62	.53	.72	27	.05	0.00	0.00
2646.50	2646.50	V	.66	.52	.79	26	.06	5.60	5.60

N.B. Code definitions at end of table
 - = no data

CODE DEFINITIONS FOR TABLE 3

POPULATION TYPE CODES

V = VITRINITE

CONTRACTOR CODES

GTS = Geotechnical Services

JOB NO. 1916A, LA BELLA - 1 OTWAY BASIN

Sample No(s)	Depth(m)/ Sample type	R _v max (%)	Range (%)	N	Description Including Liptinite Fluorescence Characteristics
v7733	1563 SWC8	0.41	0.30-0.50	25	Rare cutinite and liptodetrinite, yellow to orange, rare sporinite, bright yellow to orange, rare telalginite, bright yellow. (Silty claystone. Dom abundant, I>>V>L. Inertinite abundant, vitrinite and liptinite sparse. Oil drops rare, greenish yellow. Mineral fluorescence pervasive, faint green. Iron oxides sparse. Pyrite abundant.)
v7734	1692 SWC4	0.52	0.42-0.65	25	Common lamalginite and liptodetrinite, greenish yellow to orange. (Calcareous claystone. Dom common, I>L>V. Inertinite and liptinite common, vitrinite sparse. Bitumen rare, yellow. Mineral fluorescence pervasive, moderate green to yellowish orange. Iron oxides sparse. Glauconite sparse. Pyrite abundant.)
v7735	1865 SWC147	0.58	0.46-0.68	26	Common lamalginite, greenish yellow to orange. Sparse liptodetrinite, greenish yellow to orange. (Calcareous silty claystone. Dom abundant, I>L>V. Inertinite abundant, liptinite common, vitrinite sparse. Bitumen rare, yellow. Mineral fluorescence pervasive, moderate green to greenish yellow. Iron oxides sparse. Glauconite rare. Pyrite abundant.)
v7736	1979 SWC143	0.68	0.56-0.84	26	Sparse lamalginite and liptodetrinite, yellow to orange, rare sporinite, orange to dull orange. Clayey siltstone>>sandstone. Dom abundant, I>L>V. Inertinite abundant, liptinite common, vitrinite sparse. Bitumen rare, yellow. Mineral fluorescence pervasive, moderate green to greenish yellow. Iron oxides sparse. Glauconite rare. Pyrite abundant.)
v7737	2232 SWC103	0.66	0.57-0.79	27	Rare cutinite, lamalginite and liptodetrinite, yellow to orange, rare resinite, yellow orange. (Siltstone. Dom abundant, I>V>L. Inertinite abundant, vitrinite common, liptinite sparse. Oil drops rare, greenish yellow. Mineral fluorescence pervasive, yellow to dull orange. Iron oxides sparse. Pyrite common.)
v7738	2309 SWC93	0.62	0.52-0.75	28	Sparse cutinite, yellow to orange, sparse lamalginite bright yellow to orange, rare resinite greenish yellow to orange, rare liptodetrinite and sporinite, yellow to orange. (Siltstone>sandstone. Dom abundant, I>V>L. Inertinite and, vitrinite abundant, liptinite common. Bitumen rare, greenish yellow to orange. Oil drops rare, greenish yellow. Mineral fluorescence pervasive, faint green to dull orange. Iron oxides abundant. Pyrite common.)
v7739	2454 SWC81	0.65	0.58-0.78	27	Sparse cutinite, yellow to orange, rare lamalginite, sporinite and liptodetrinite, yellow to orange. (Siltstone. Dom abundant, I>V>L. Inertinite and vitrinite abundant, liptinite sparse. Bitumen rare, orange. Mineral fluorescence pervasive, faint green to dull orange. Iron oxides common. Pyrite sparse.)

JOB NO. 1916A, LA BELLA - 1 OTWAY BASIN

Sample No(s)	Depth(m)/ Sample type	R _v max (%)	Range (%)	N	Description Including Liptinite Fluorescence Characteristics
v7740	2540.5 SWC-74	0.62	0.53-0.72	27	Fluorescing liptinite absent. Coal, V>>I. Vitrite only. Mineral-free maceral group composition of the coal: vitrinite - 100%, inertinite - <<0.1%, liptinite - absent. Iron oxides rare. Pyrite rare.)
v7741	2646.5 SWC-65	0.66	0.52-0.79	26	Sparse cutinite, yellow to orange, rare telalginite and lamalginite, bright yellow to orange, rare sporinite and liptodetrinite, yellow to orange. (Carbonate>calcareous sandstone>claystone. Dom common, I>L>V. Inertinite common, liptinite and vitrinite sparse. Bitumen rare, yellow to orange. Mineral fluorescence pervasive, faint green to orange. Iron oxides common. Pyrite sparse.)

TABLE 4

SUMMARY OF WHOLE OIL ANALYSIS

=====

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH 1 = 2072.80
 DEPTH 2 = 2072.80

DEPTH UNIT = Metres
 DATE OF JOB = Sept 93

DESCRIPTION : RFT SAMPLE

COMPOSITION BY CARBON NUMBER

COMPOSITION OF C4-C8 FRACTION

Data Type = ALL CMPDS

Carbon Number	Rel. Wt %	Compound	Rel. Wt %
1 - 3	0.02	isobutane (A)	0.10
4	0.50	n-butane (B)	0.40
5	6.34	isopentane (C)	2.70
6	24.70	n-pentane (D)	3.13
7	30.05	2,2-dimethylbutane (E)	0.42
8	11.57	cyclopentane (F)	0.51
9	6.51	2,3-dimethylbutane (G)	0.87
10	7.51	2-methylpentane (H)	4.25
11	4.22	3-methylpentane (I)	2.40
12	2.87	n-hexane (J)	5.27
13	1.88	methylcyclopentane (K)	4.77
14	1.37	2,4-dimethylpentane (L)	0.58
15	0.88	benzene (M)	0.39
16	0.36	cyclohexane (N)	6.33
17	0.65	1,1-dimethylcyclopentane (O)	0.81
18	0.15	2-methylhexane (P)	2.04
19	0.08	3-methylhexane (Q)	3.16
20	0.04	1 cis-3-dimethylcyclopentane (R)	1.00
21	0.02	1 trans-3-dimethylcyclopentane (S)	1.68
22	0.07	1 trans-2-dimethylcyclopentane (T)	0.13
23	0.14	n-heptane (U)	4.34
24	0.01	methylcyclohexane (V)	14.79
25	0.01	1 cis-2-dimethylcyclopentane (W)	0.34
26	0.02	n-toluene (X)	1.19
27	0.00	n-octane (Y)	3.16
28	0.01	ethylbenzene (Z)	0.51
29	0.00	M+P-xylene (AA)	0.69
30	0.01	O_xylene (BB)	0.25
31	0.01		
32	0.00		
33	-		

CALCULATED DATA - C12+ FRACTION

CALCULATED DATA - C4-C8 FRACTION

 Pristane/Phytane 8.38
 Pristane/n-C17 2.66
 Phytane/n-C18 0.52
 TMTD/Pristane 0.78
 (C21+C22)/(C28+C29) 7.33

 Paraffin Index I 1.85
 Paraffin Index II 12.65
 N/K (Maturity) 1.33
 C/D (Maturity) 0.86
 J/K (Maturity) 1.10
 I/M (Water Washing) 6.18
 I/J (Biodegradation) 0.45

 TMTD = Trimethyltridecane
 - = Below detection limit
 or not measured

 Paraffin Index I = (P+Q) / (R+S+T)
 Paraffin Index II = %U in all compounds
 N to V and including
 2,2-DiMeC6 and 2,3-DiMeC5

TABLE 5

SUMMARY OF WHOLE OIL ANALYSIS

WELL = LA BELLA-1 DEPTH 1 = 2160.50 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2 = 2160.50 DATE OF JOB = Sept 93
 BASIN = Otway

DESCRIPTION : RFT SAMPLE

COMPOSITION BY CARBON NUMBER

COMPOSITION OF C4-C8 FRACTION

Data Type = ALL CMPDS

Carbon Number	Rel. Wt %	Compound	Rel. Wt %
1 - 3	0.13	isobutane (A)	0.45
4	1.87	n-butane (B)	1.42
5	10.78	isopentane (C)	4.21
6	30.57	n-pentane (D)	5.55
7	38.41	2,2-dimethylbutane (E)	0.57
8	8.05	cyclopentane (F)	1.03
9	3.30	2,3-dimethylbutane (G)	0.44
10	2.98	2-methylpentane (H)	4.64
11	1.25	3-methylpentane (I)	2.53
12	0.89	n-hexane (J)	5.47
13	0.48	methylcyclopentane (K)	5.84
14	0.37	2,4-dimethylpentane (L)	9.42
15	0.22	benzene (M)	1.26
16	0.12	cyclohexane (N)	9.82
17	0.18	1,1-dimethylcyclopentane (O)	0.60
18	0.08	2-methylhexane (P)	1.72
19	0.06	3-methylhexane (Q)	2.45
20	0.05	1 cis-3-dimethylcyclopentane (R)	0.80
21	0.04	1 trans-3-dimethylcyclopentane (S)	1.39
22	0.03	1 trans-2-dimethylcyclopentane (T)	0.10
23	0.02	n-heptane (U)	3.09
24	0.06	methylcyclohexane (V)	14.86
25	0.02	1 cis-2-dimethylcyclopentane (W)	0.22
26	0.01	n-toluene (X)	3.76
27	0.01	n-octane (Y)	1.66
28	0.01	ethylbenzene (Z)	0.51
29	0.00	M+P-xylene (AA)	1.85
30	0.00	O_xylene (BB)	0.44
31	0.00		
32	0.00		
33	-		

CALCULATED DATA - C12+ FRACTION

CALCULATED DATA - C4-C8 FRACTION

Pristane/Phytane 4.91
 Pristane/n-C17 0.83
 Phytane/n-C18 0.21
 TMTD/Pristane 0.85
 (C21+C22)/(C28+C29) 7.50

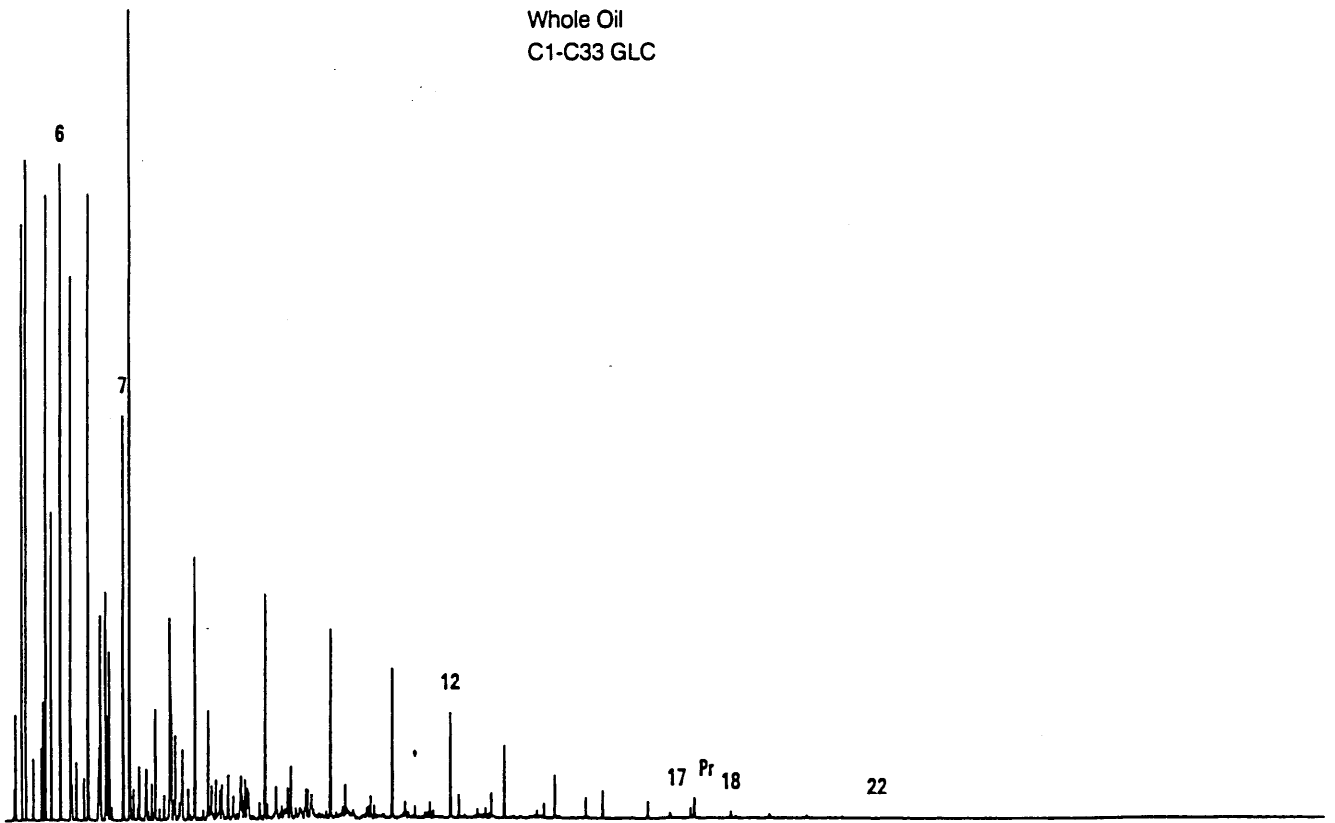
Paraffin Index I 1.82
 Paraffin Index II 8.88
 N/K (Maturity) 1.68
 C/D (Maturity) 0.76
 J/K (Maturity) 0.94
 I/M (Water Washing) 2.00
 I/J (Biodegradation) 0.46

TMTD = Trimethyltridecane
 - = Below detection limit
 or not measured

Paraffin Index I = (P+Q) / (R+S+T)
 Paraffin Index II = %U in all compounds
 N to V and including
 2,2-DiMeC6 and 2,3-DiMeC5

FIGURE 11

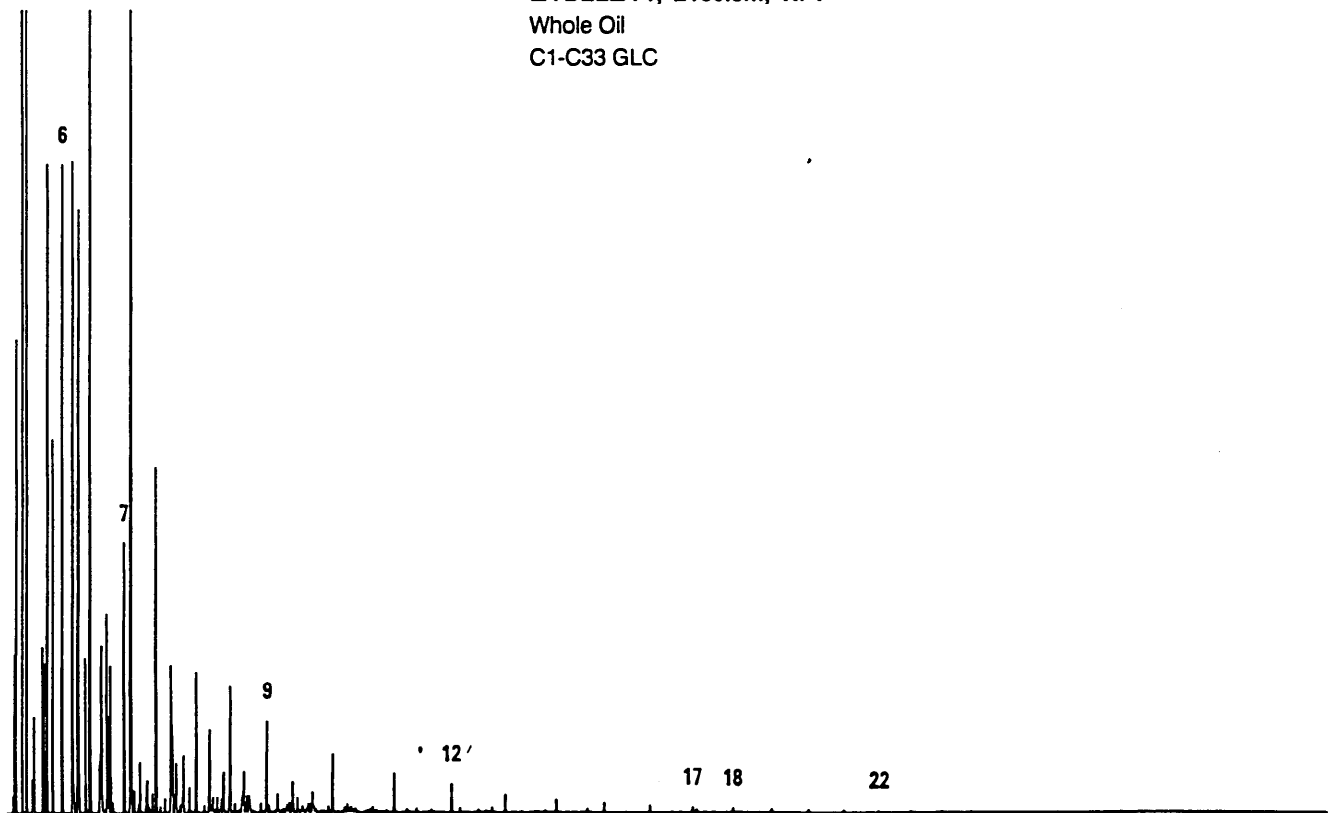
LA BELLA 1, 2072.8m, RFT
Whole Oil
C1-C33 GLC



1644402

GEOTECHNICAL SERVICES PTY LTD

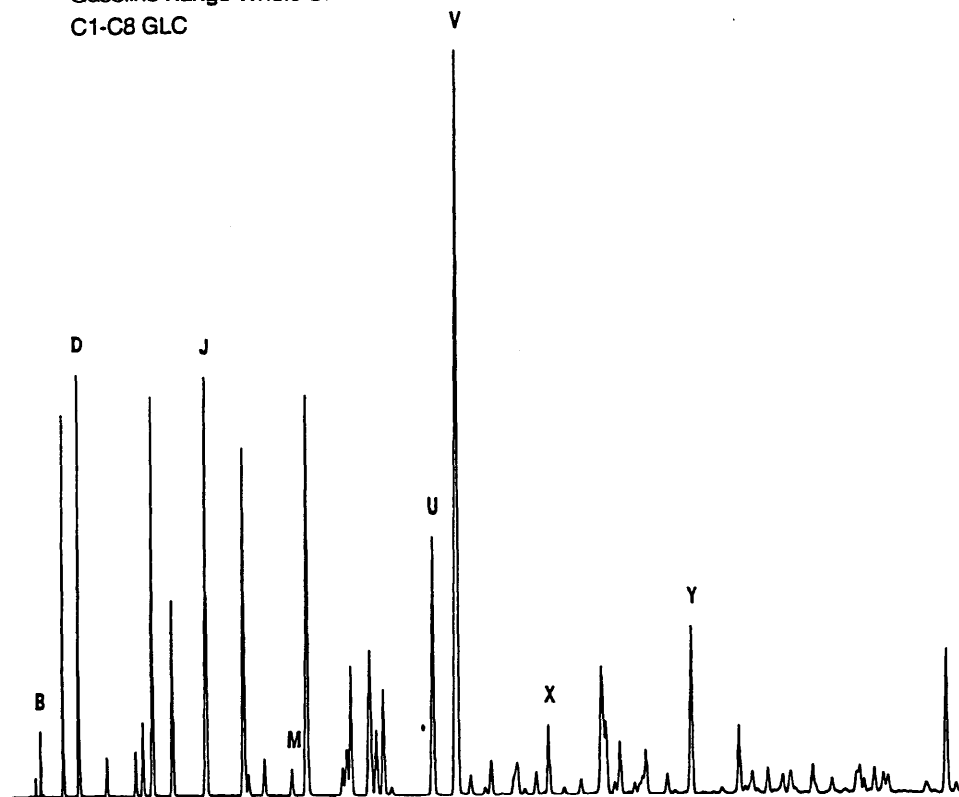
LA BELLA 1, 2160.5m, RFT
Whole Oil
C1-C33 GLC



1644401

GEOTECHNICAL SERVICES PTY LTD

LA BELLA 1, 2072.8m, RFT
Gasoline Range Whole Oil
C1-C8 GLC

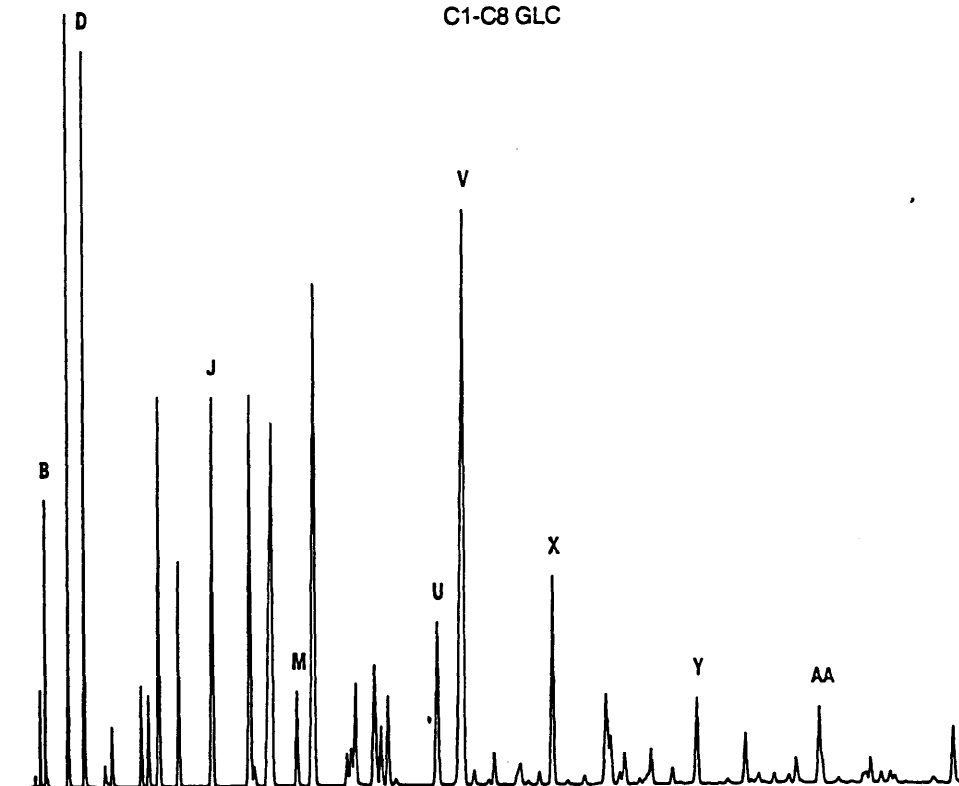


C4-C8 Compounds

- A isobutane
- B n-butane
- C isopentane
- D n-pentane
- E 2,2-dimethylbutane
- F cyclopentane
- G 2,3-dimethylbutane
- H 2-methylpentane
- I 3-methylpentane
- J n-hexane
- K methylcyclopentane
- L 2,4-dimethylpentane
- M benzene
- N cyclohexane
- O 1,1-dimethylcyclopentane
- P 2-methylhexane
- Q 3-methylhexane
- R 1 cis-3-dimethylcyclopentane
- S 1 trans-3-dimethylcyclopentane
- T 1 trans-2-dimethylcyclopentane
- U n-heptane
- V methylcyclohexane
- W 1 cis-2-dimethylcyclopentane
- X toluene
- Y n-octane
- Z ethylbenzene
- AA M + P-xylene
- BB O-xylene

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LA BELLA 1, 2160.5m, RFT
Gasoline Range Whole Oil
C1-C8 GLC



C4-C8 Compounds

- A isobutane
- B n-butane
- C isopentane
- D n-pentane
- E 2,2-dimethylbutane
- F cyclopentane
- G 2,3-dimethylbutane
- H 2-methylpentane
- I 3-methylpentane
- J n-hexane
- K methylcyclopentane
- L 2,4-dimethylpentane
- M benzene
- N cyclohexane
- O 1,1-dimethylcyclopentane
- P 2-methylhexane
- Q 3-methylhexane
- R 1 cis-3-dimethylcyclopentane
- S 1 trans-3-dimethylcyclopentane
- T 1 trans-2-dimethylcyclopentane
- U n-heptane
- V methylcyclohexane
- W 1 cis-2-dimethylcyclopentane
- X toluene
- Y n-octane
- Z ethylbenzene
- AA M + P-xylene
- BB O-xylene

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LA BELLA - 1

Whole Oil GC Data

Normalised Compound Abundances

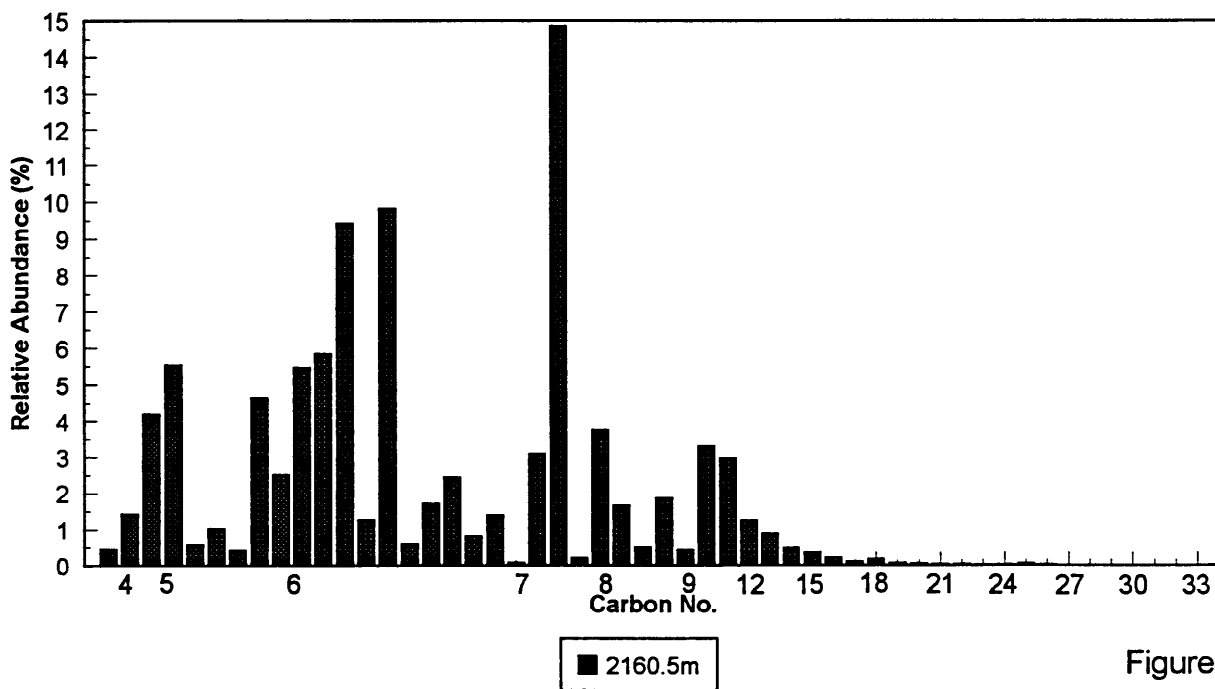
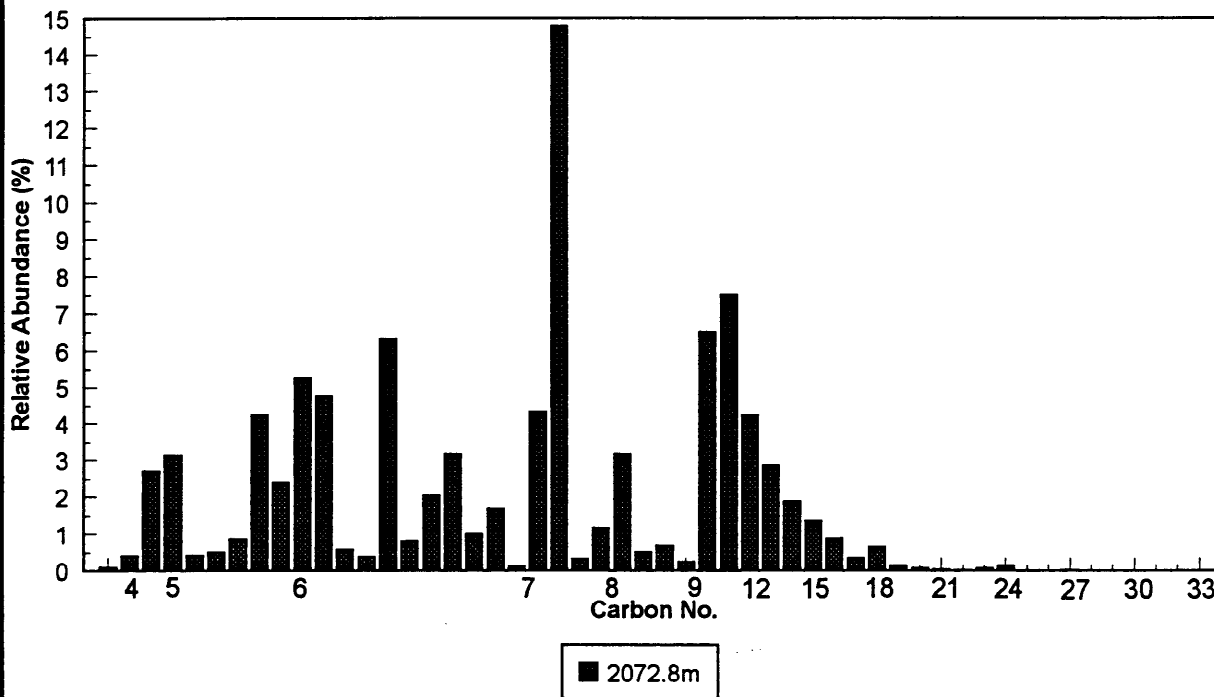


Figure 13

LA BELLA-1
Whole Oil GC Data
Normalised Compound Abundances

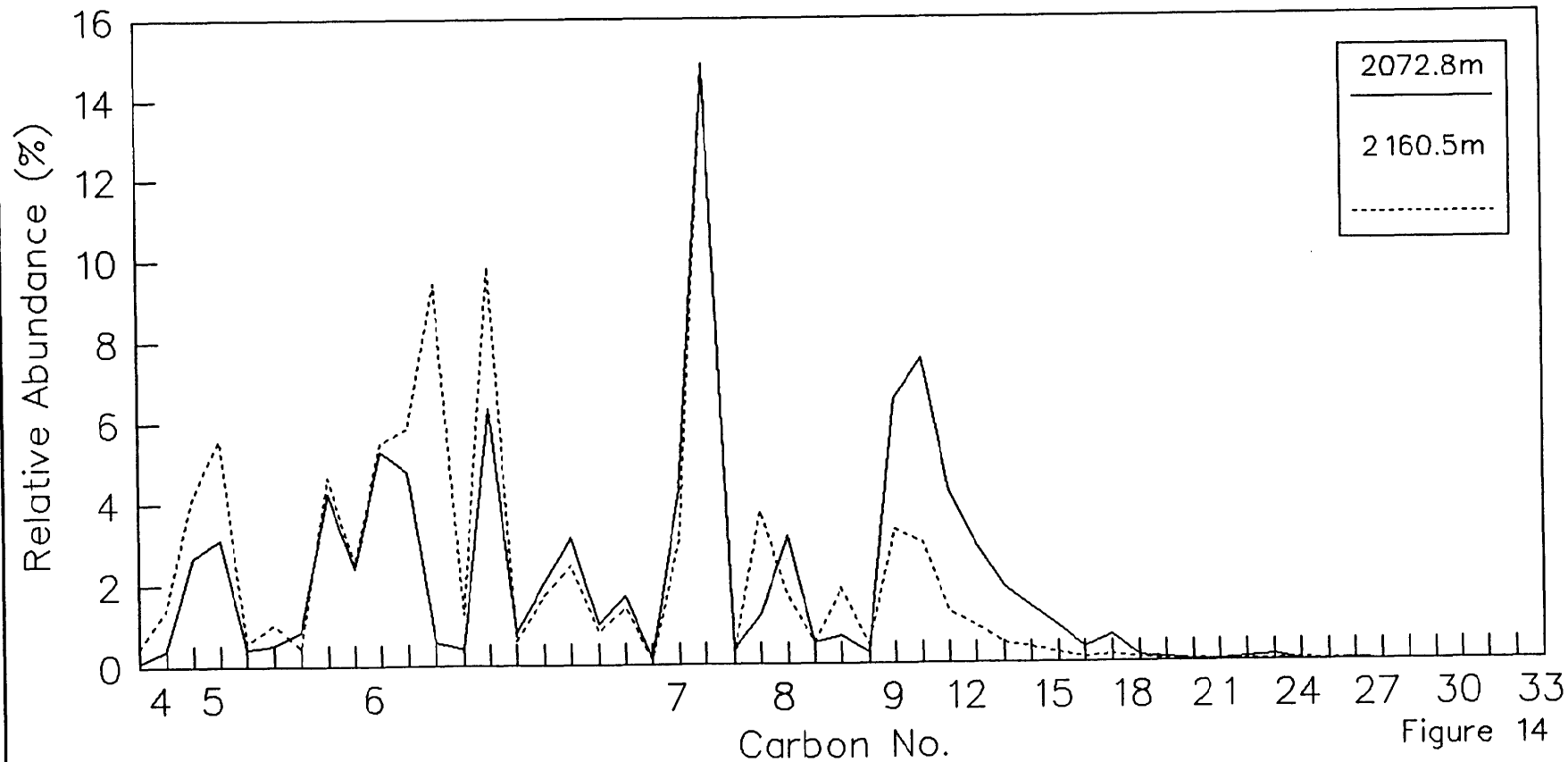
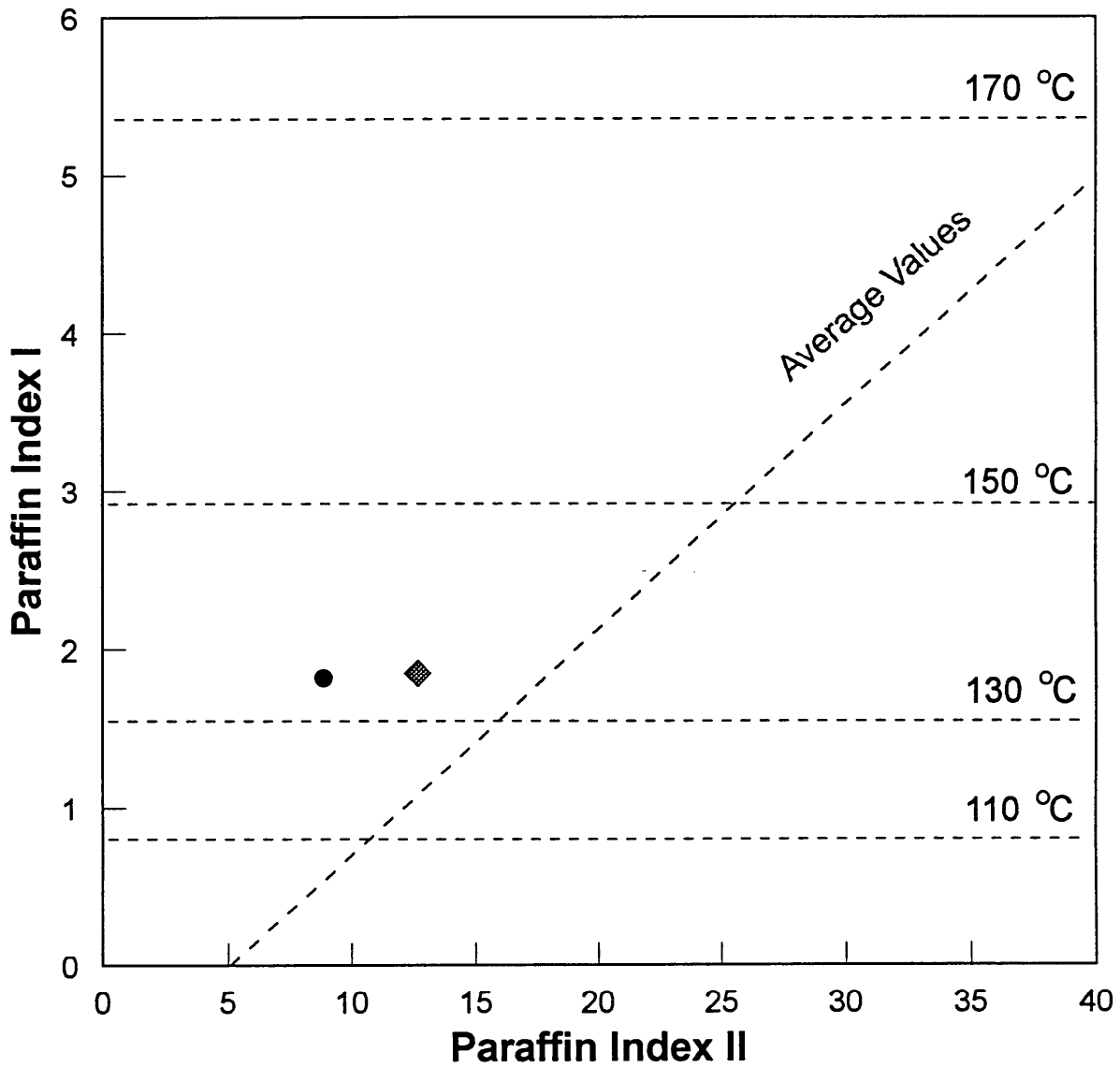


Figure 14

LA BELLA - 1
Whole Oil GC Data
Paraffin Index I vs Paraffin Index II



2072.8m 2160.5m
◆ ●

Figure 15

TABLE 6

SUMMARY OF EXTRACTION AND LIQUID CHROMATOGRAPHY - SEDIMENTS

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1	DEPTH 2	WEIGHT OF ROCK EXT (grams)	TOTAL EXTRACT (ppm)	LOSS ON COLUMN (ppm)	% REC.	SATURATES (ppm)	AROMATICS (ppm)	POLARS (ppm)	SATURATES (rel %)	AROMATICS (rel %)	POLARS (rel %)	EOM(mg)/ TOC(g)	SAT(mg)/ TOC(g)	SAT/ AROM	HC/ non-HC
2070.00	2070.00	18.70	332.4	-	-	-	-	-	-	-	-	-	-	-	-
2071.20	2071.20	49.70	376.0	-	-	-	-	-	-	-	-	-	-	-	-
2095.15	2095.20	97.10	244.0	-	-	-	-	-	-	-	-	-	-	-	-
2097.70	2097.70	81.40	443.4	-	-	-	-	-	-	-	-	11.9	-	-	-
2100.00	2110.00	74.80	344.8	37.4	89.2	116.3	96.2	94.9	37.8	31.3	30.9	-	-	1.21	2.24
2102.50	2102.50	10.60	783.8	-	-	-	-	-	-	-	-	-	-	-	-
2121.00	2121.00	13.50	665.2	-	-	-	-	-	-	-	-	-	-	-	-
2159.00	2159.00	10.60	511.4	-	-	-	-	-	-	-	-	-	-	-	-

EOM = Extractable organic matter
 AROM = aromatic compounds

POLARS = Polar (Asphaltenes + resins)
 HC = Hydrocarbon

TOC = Total organic carbon
 REC. = Recovered

SAT = Saturated compounds
 - = no data

LA BELLA - 1
Total Extract Yield vs Depth

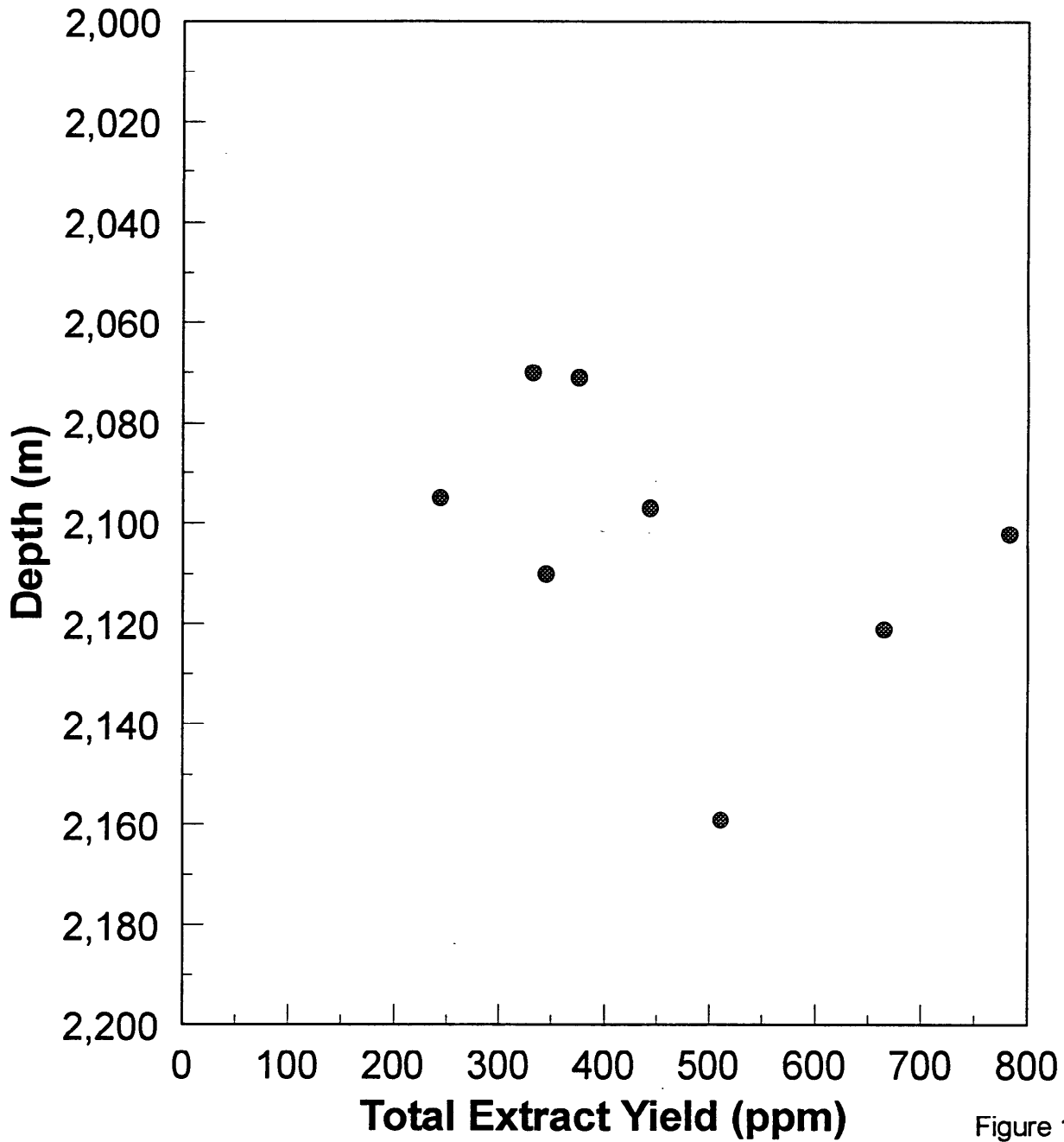
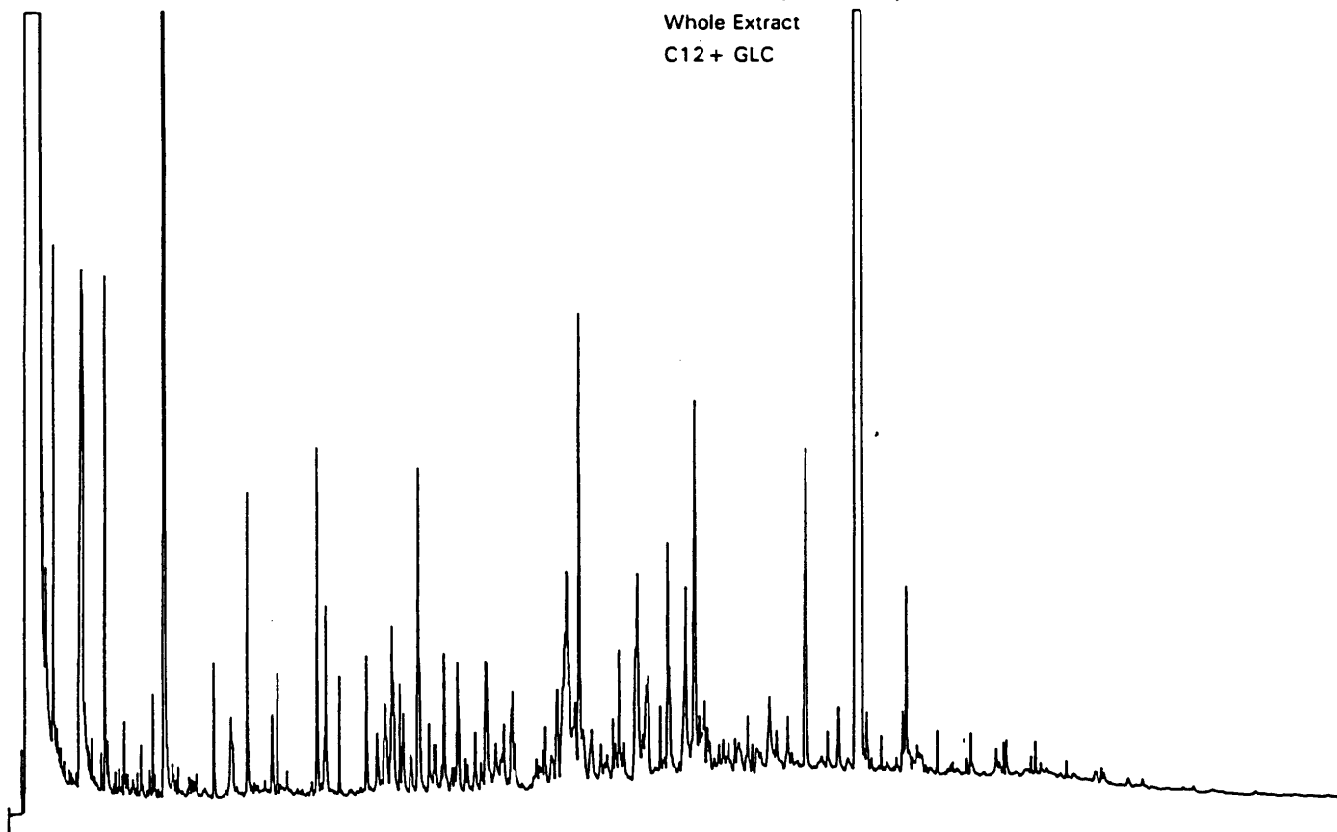


Figure 16

FIGURE 17a

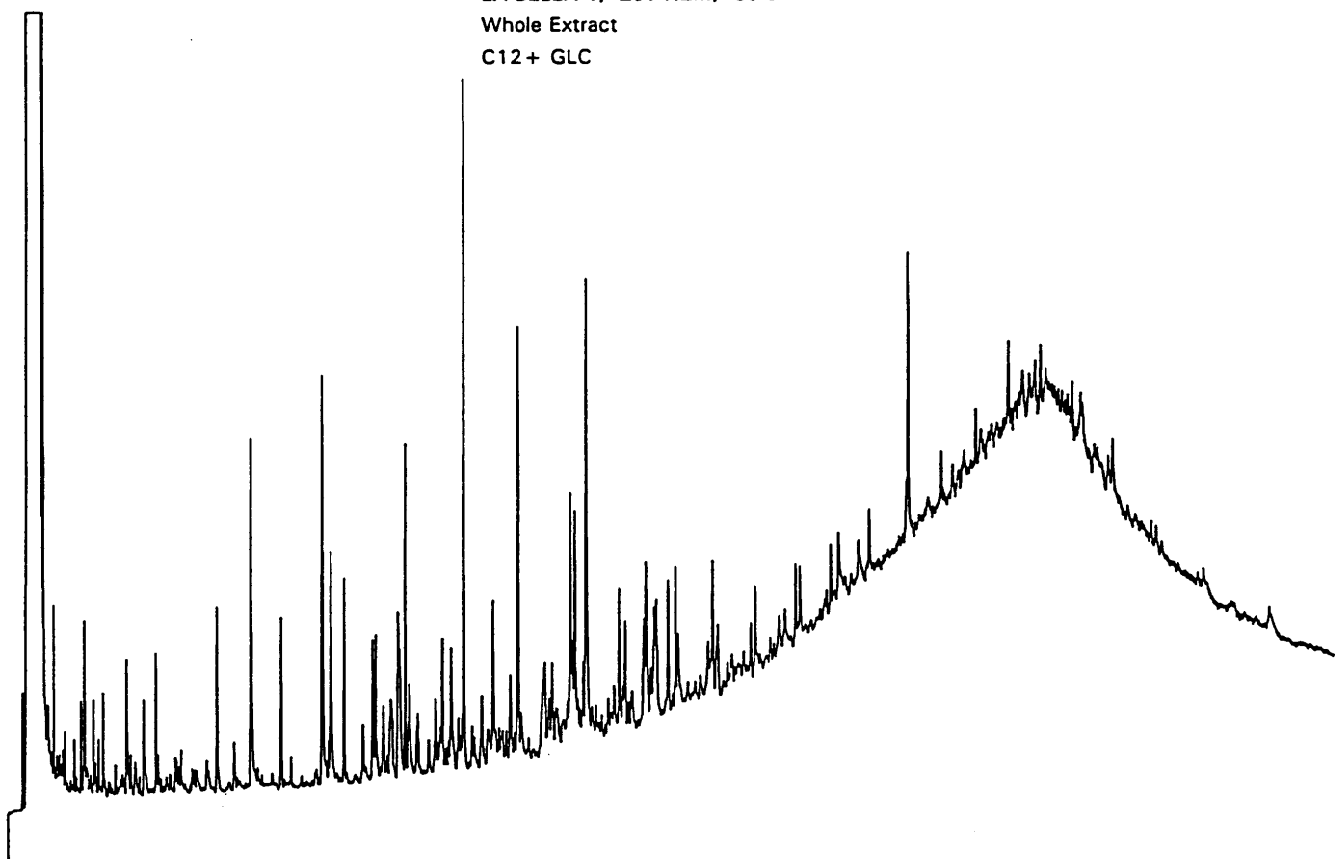
LA BELLA 1, 2070.0m, SWC
Whole Extract
C12+ GLC



1994ED7

GEOTECHNICAL SERVICES PTY LTD

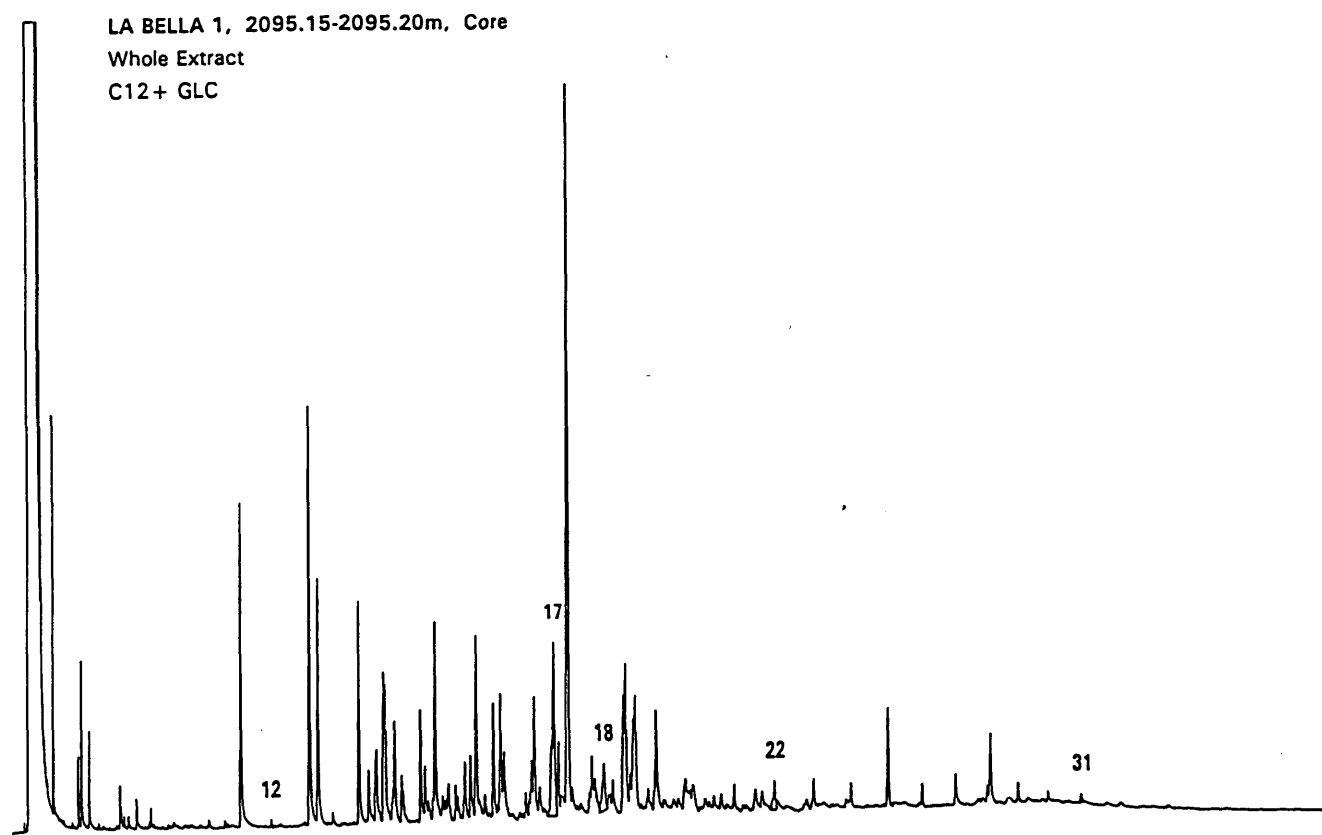
LA BELLA 1, 2071.2m, Core
Whole Extract
C12+ GLC



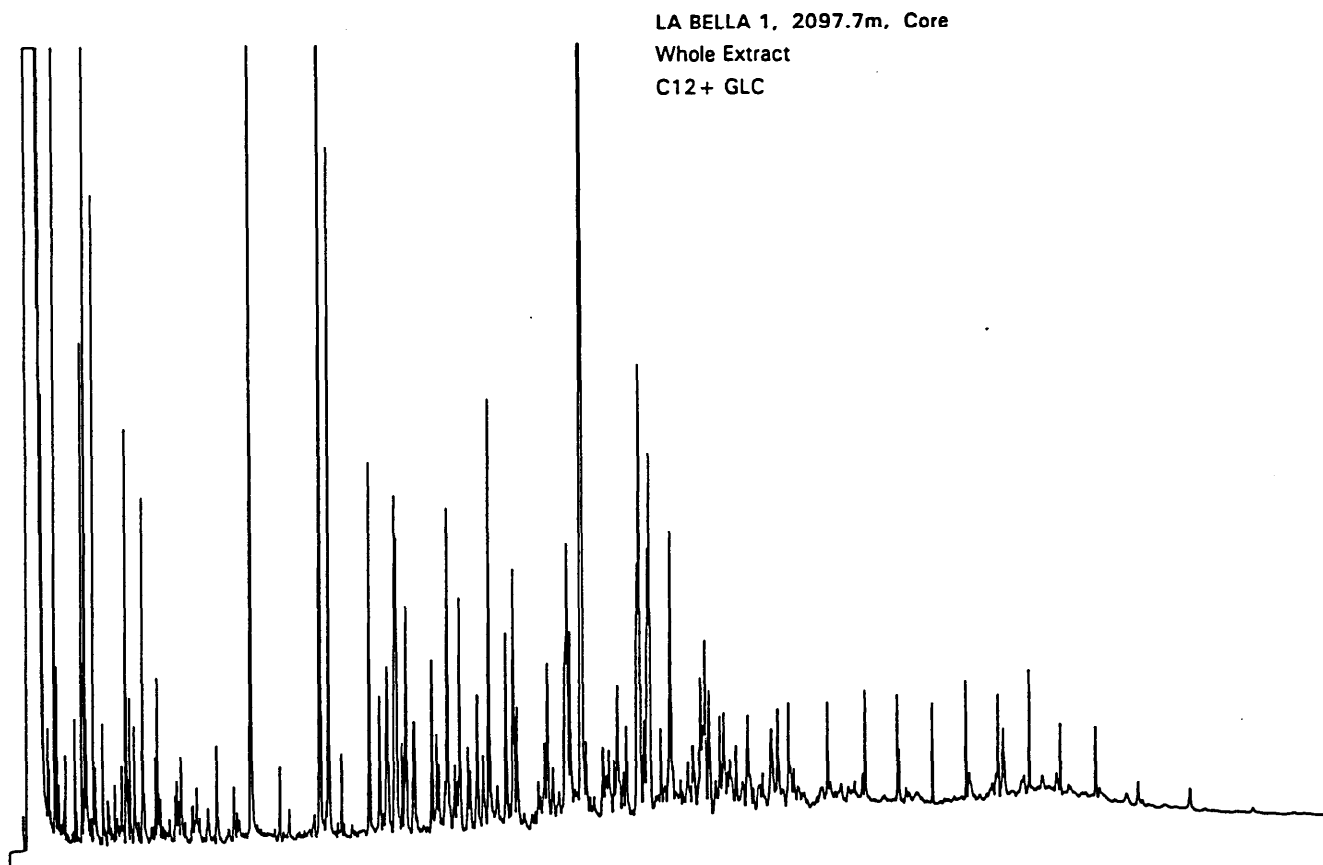
1994ED7

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FIGURE 17b



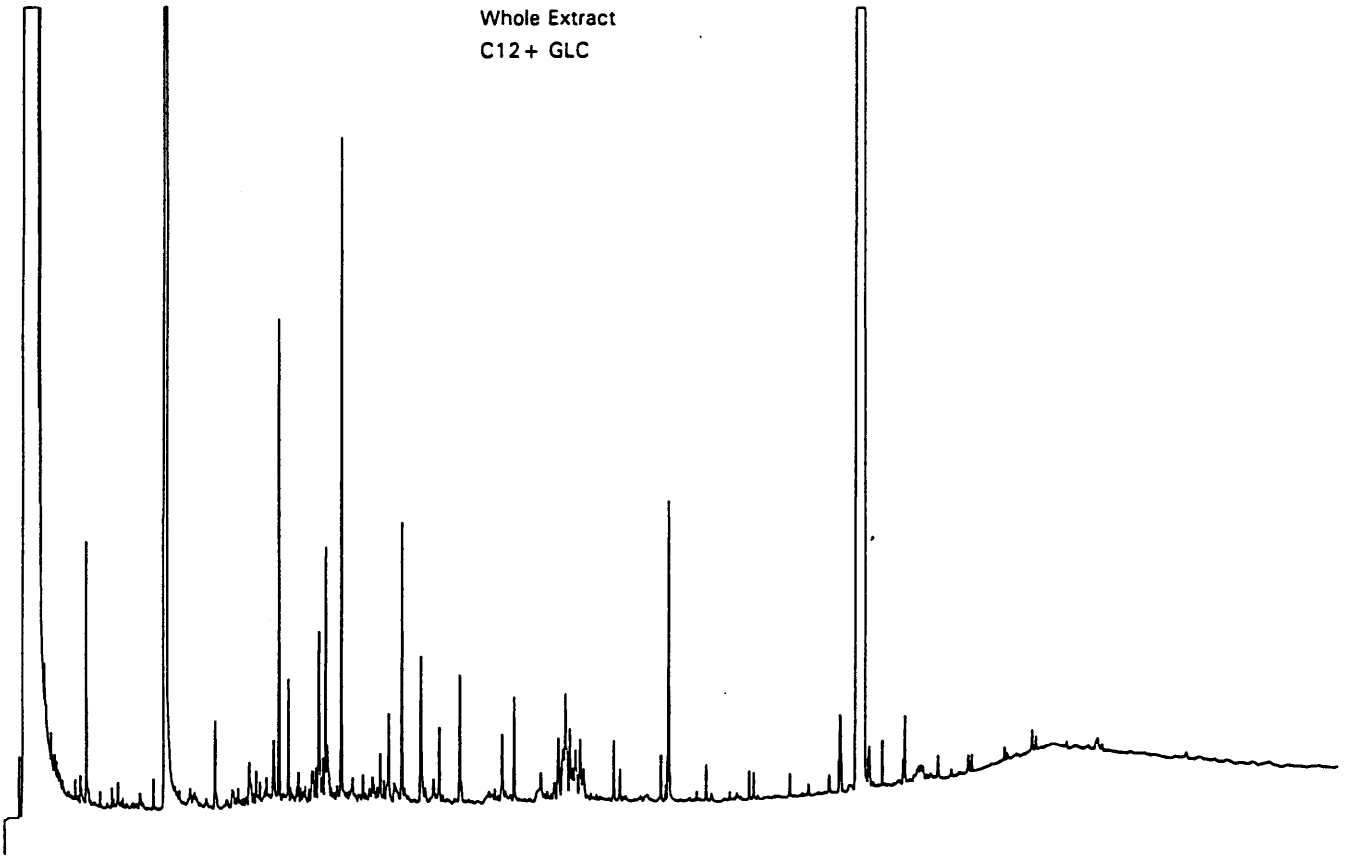
GEOTECHNICAL SERVICES PTY LTD



GEOTECHNICAL SERVICES PTY LTD

FIGURE 17c

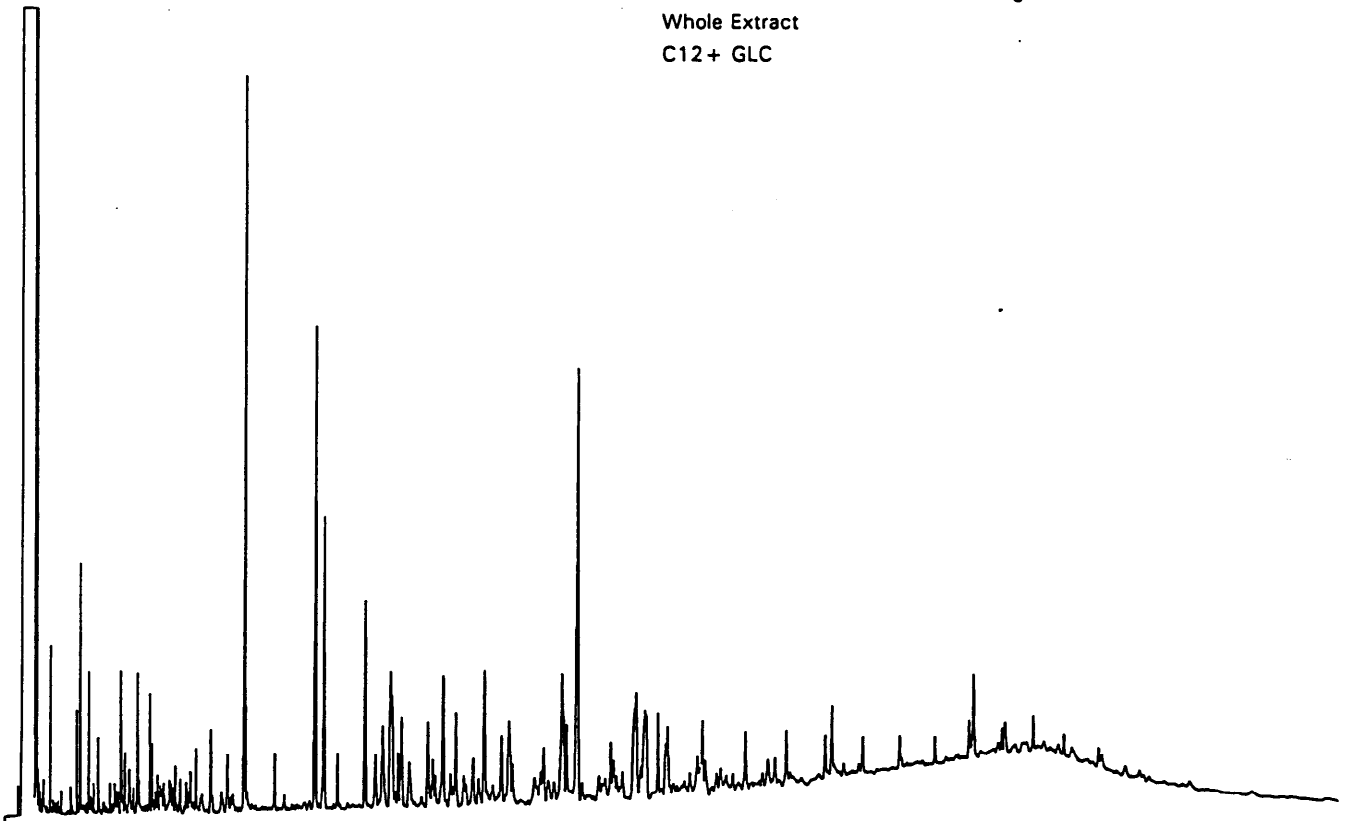
LA BELLA 1, 2102.5m, SWC
Whole Extract
C12+ GLC



14/03/04

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LA BELLA 1, 2100-2110m, Cuttings
Whole Extract
C12+ GLC

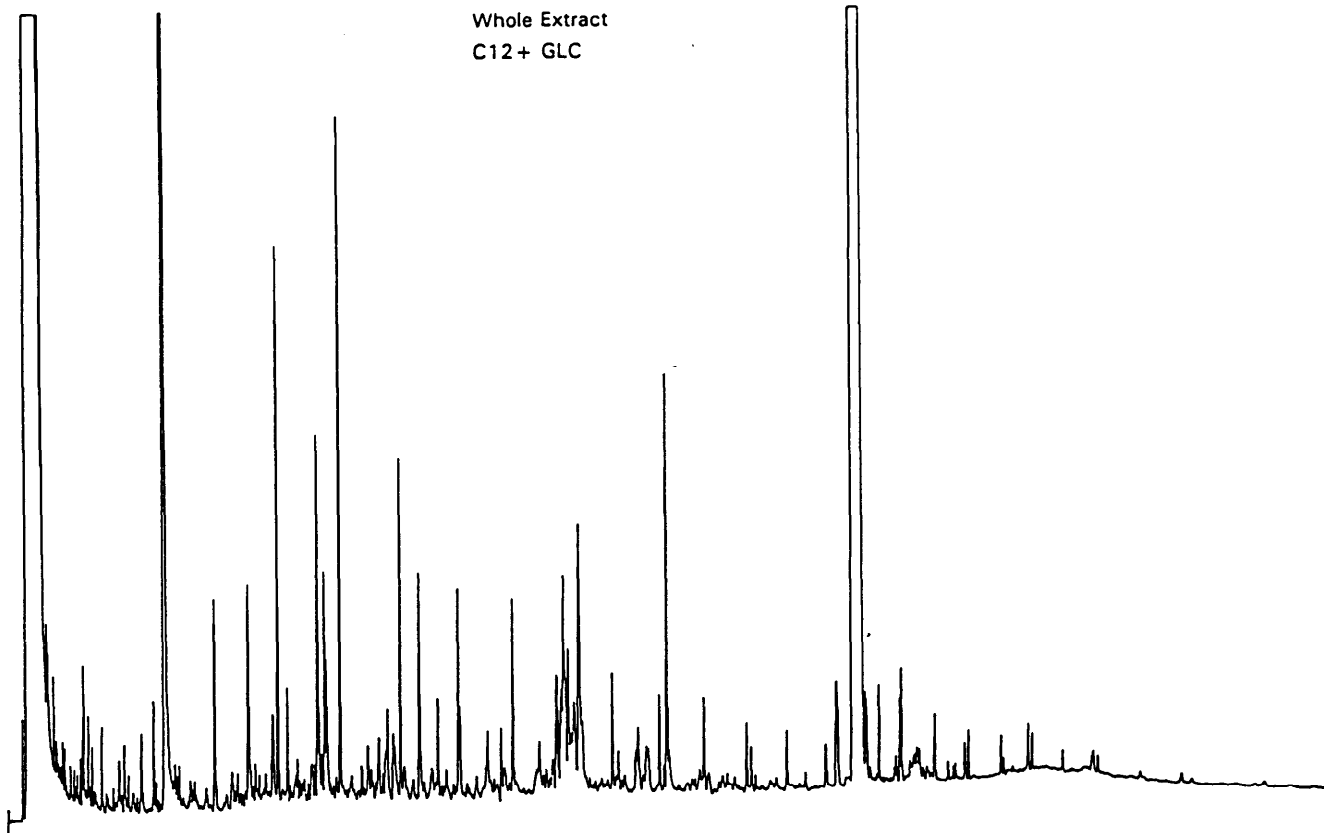


14/03/04

GEOTECHNICAL SERVICES PTY LTD

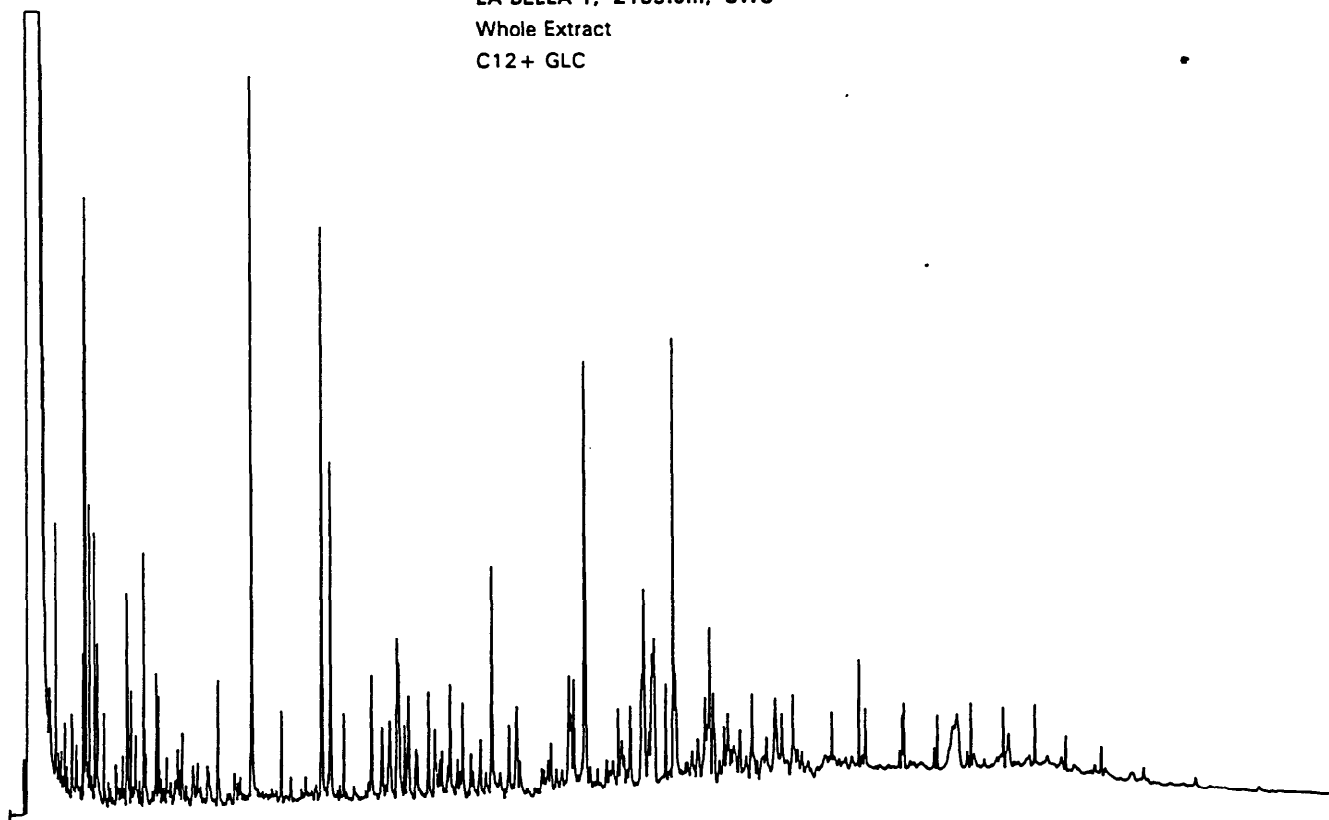
FIGURE 17d

LA BELLA 1, 2121.0m, SWC
Whole Extract
C12+ GLC



GEOTECHNICAL SERVICES PTY LTD

LA BELLA 1, 2159.0m, SWC
Whole Extract
C12+ GLC



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TABLE 7

SUMMARY OF LIQUID CHROMATOGRAPHY - CONDENSATES

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1	DEPTH 2	SATURATES (REL %)	AROMATICS (REL %)	POLARS (REL %)	SAT/ AROM	HC/ non-HC
2072.80	2072.80	-	-	-	-	-
2160.50	2160.50	-	-	-	-	-

SAT = Saturated compounds AROM = Aromatic compounds
 HC = Hydrocarbon - = no data

LA BELLA - 1 LC Separation Data

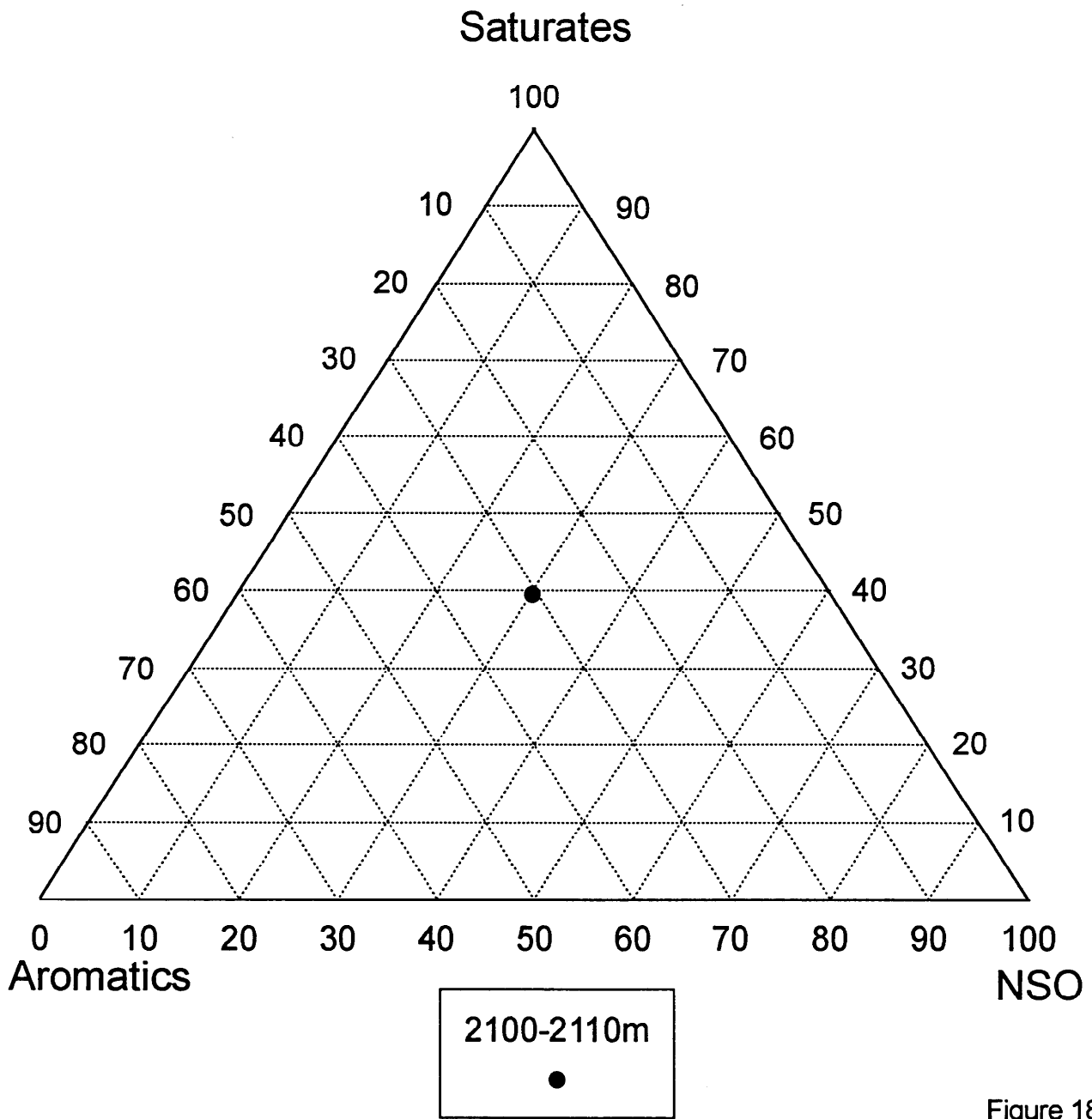
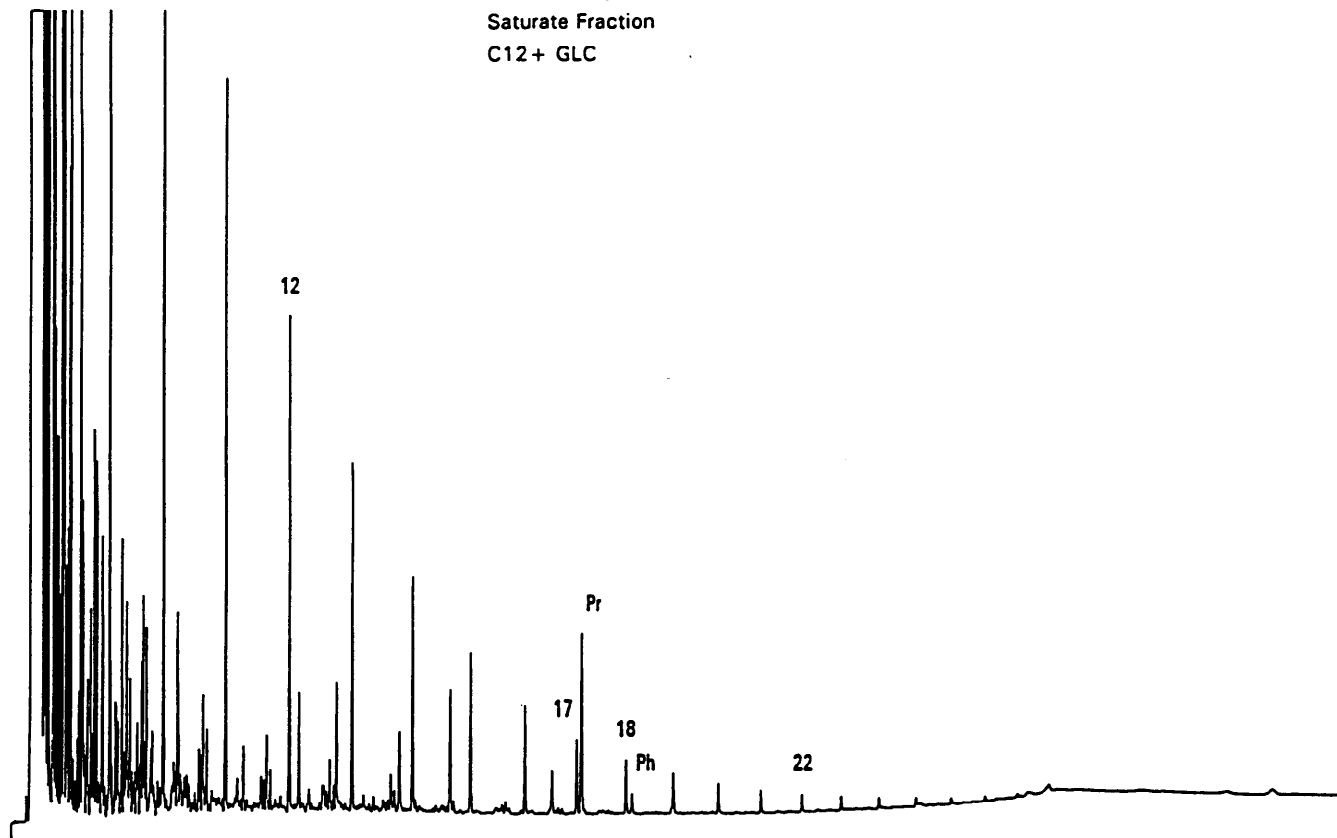


Figure 18

FIGURE 19

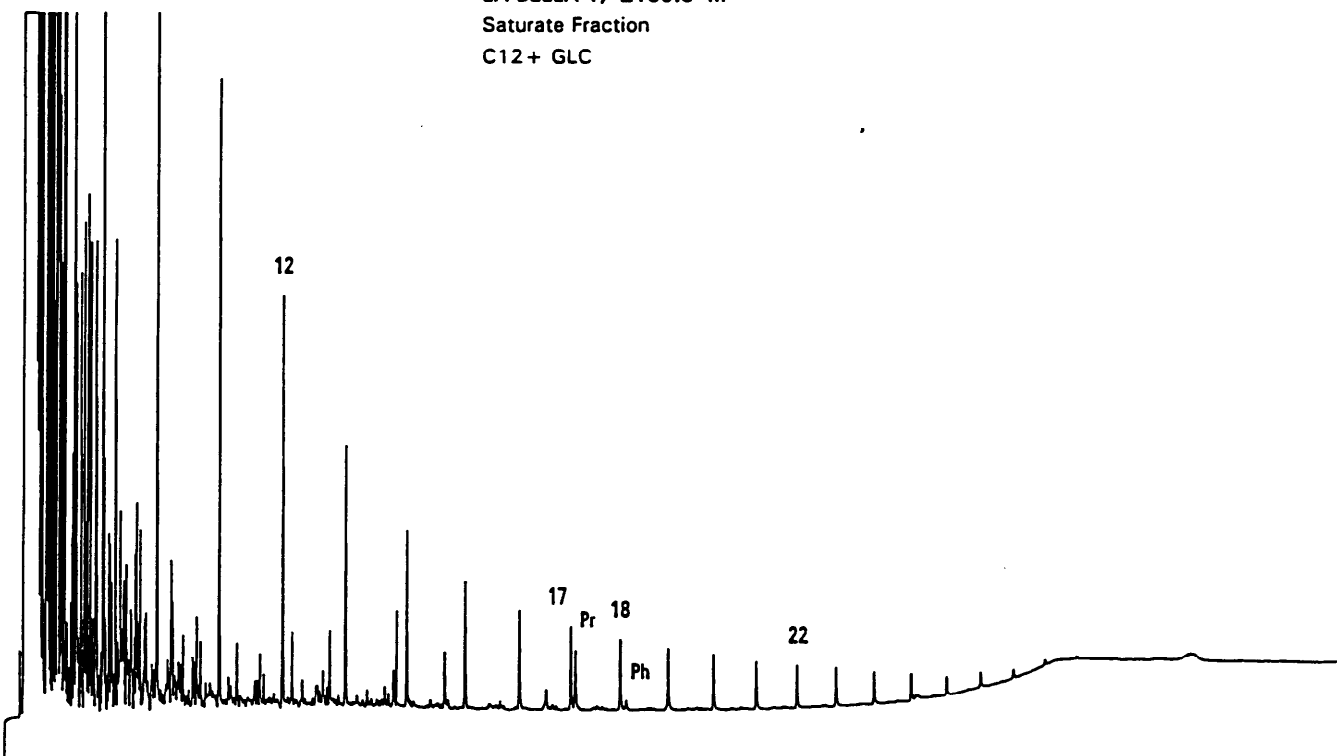
LA BELLA 1, 2072.8 m
Saturate Fraction
C12+ GLC



100000

GEOTECHNICAL SERVICES PTY LTD

LA BELLA 1, 2160.5 m
Saturate Fraction
C12+ GLC



100000

GEOTECHNICAL SERVICES PTY LTD

TABLE 8

SUMMARY OF GAS CHROMATOGRAPHY DATA - CONDENSATES
ALKANE DISTRIBUTIONS

WELL NAME = LA BELLA-1
COUNTRY = Australia
BASIN = Otway

DEPTH UNIT = Metres
DATE OF JOB = Oct 93

DEPTH 1	DEPTH 2	nC12	nC13	nC14	TMTD	nC15	nC16	iC18	nC17	iC19	nC18	iC20	nC19	nC20	nC21	nC22	nC23	nC24	nC25	nC26	nC27	nC28	nC29	nC30	nC31	nC32	nC33
2072.80	2072.80	21.6	16.1	11.2	6.1	8.2	5.4	3.1	4.2	10.7	2.9	1.3	2.6	1.7	1.3	1.0	.8	.6	.5	.4	.3	.2	0.0	0.0	0.0	0.0	0.0
2160.50	2160.50	19.5	13.3	9.7	3.0	7.3	5.8	1.8	5.1	4.1	4.7	.7	4.4	3.8	3.2	2.9	2.5	2.2	2.0	1.3	1.1	.6	.4	.2	.2	0.0	0.0

i = iso
- = no data

n = normal
TMTD = Trimethyltridecane

N.B. Values are relative %

LA BELLA - 1: Condensates

GC (Sats) Normalised Relative Abundance

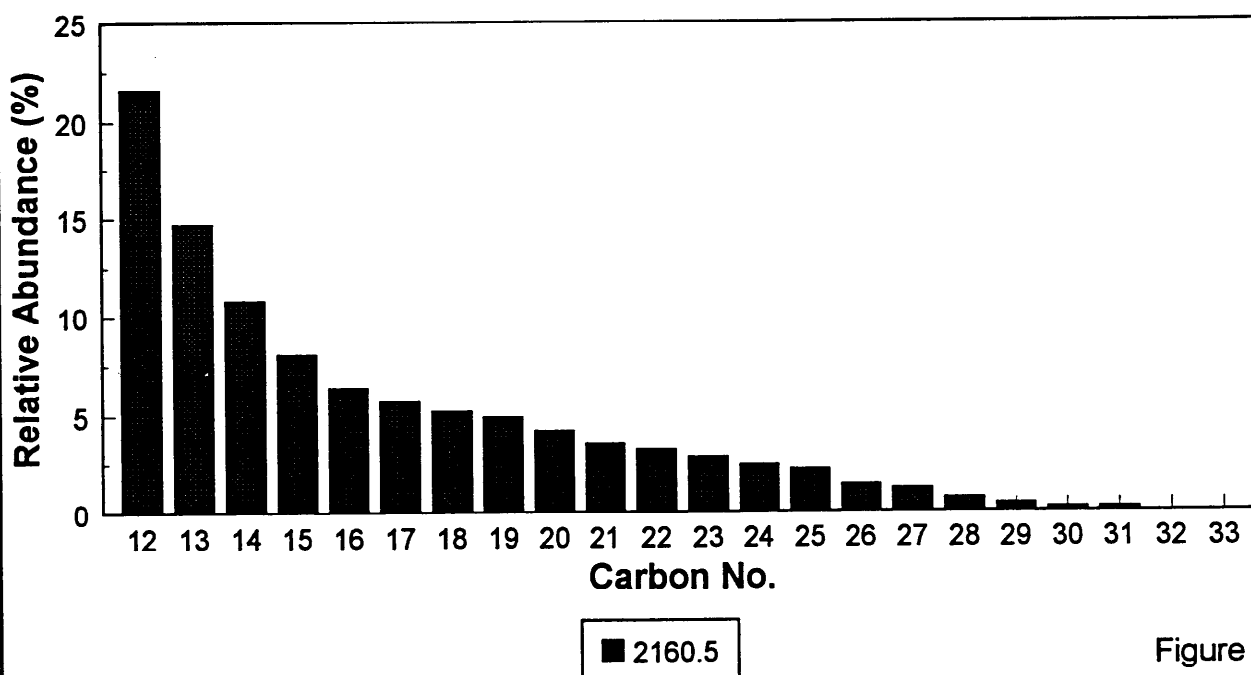
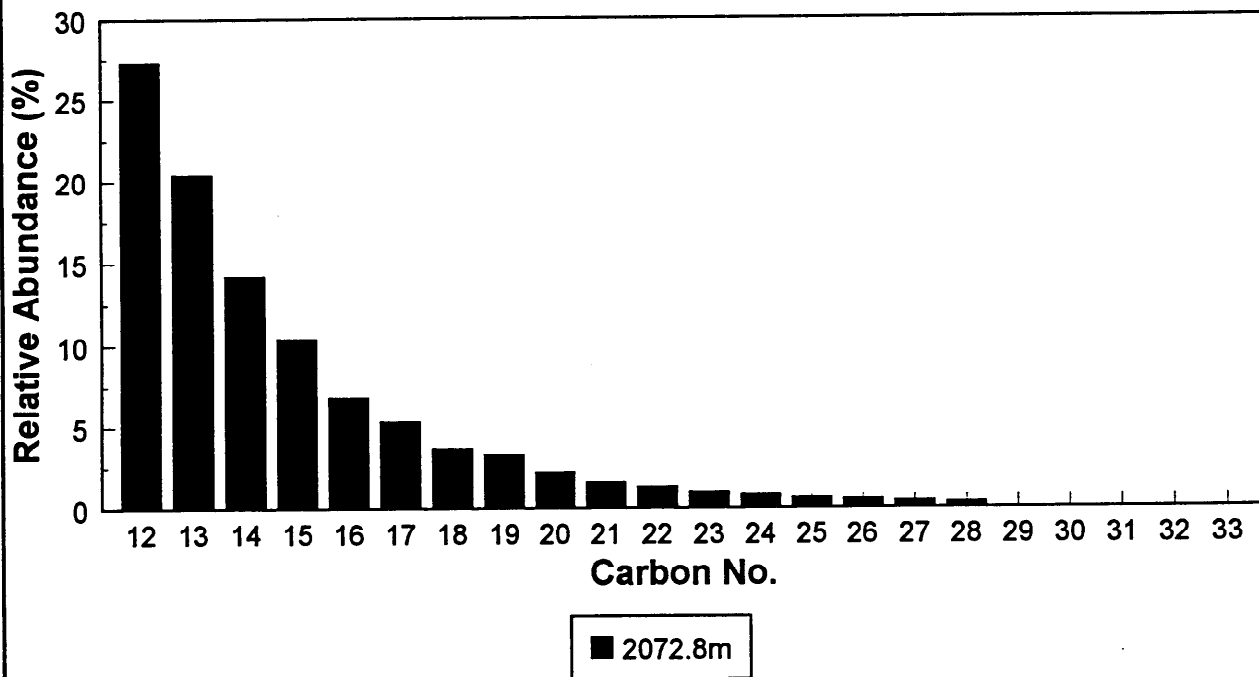


Figure 20

LA BELLA - 1: Condensates

GC (Sats) Normalised Relative Abundance

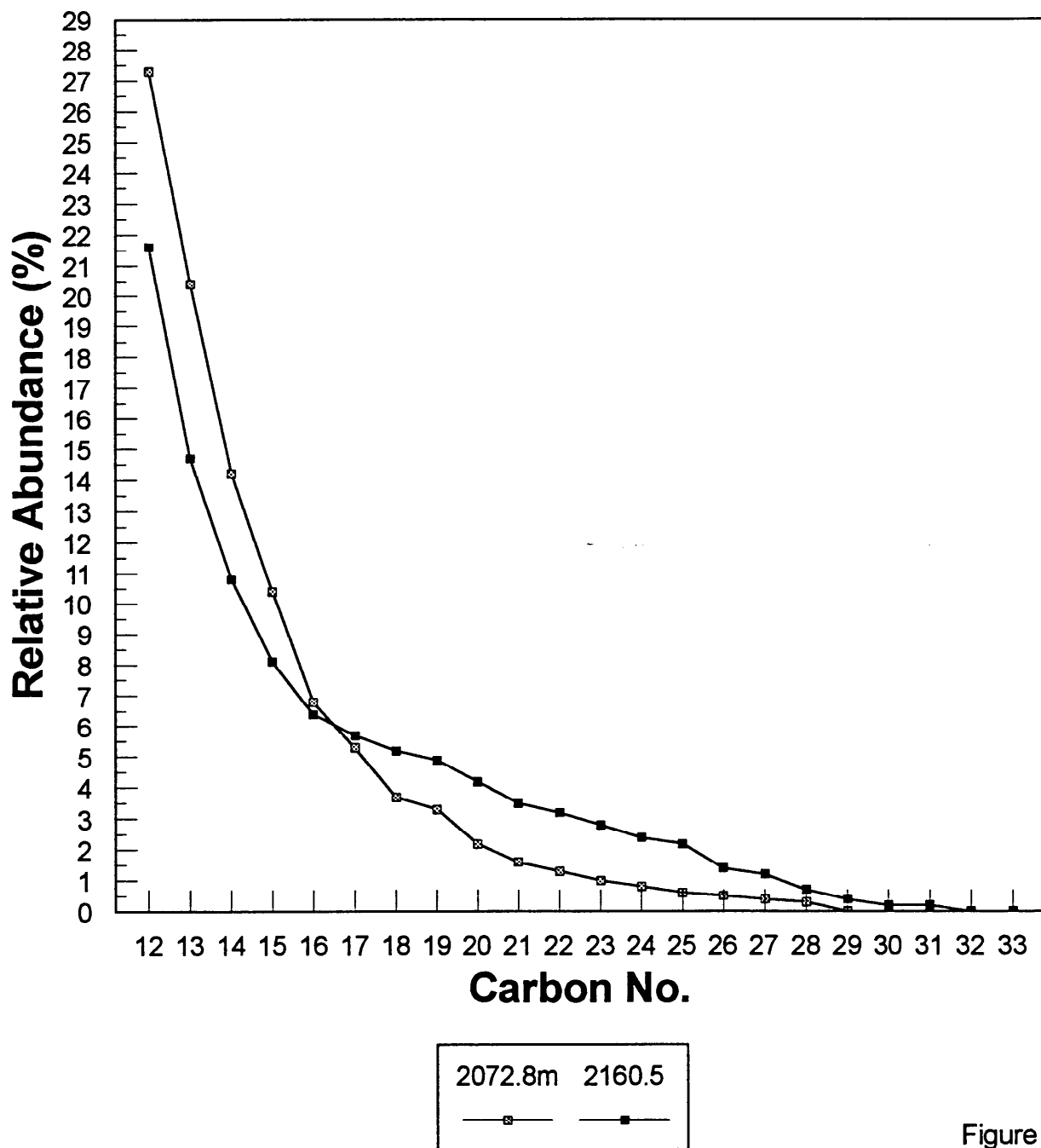
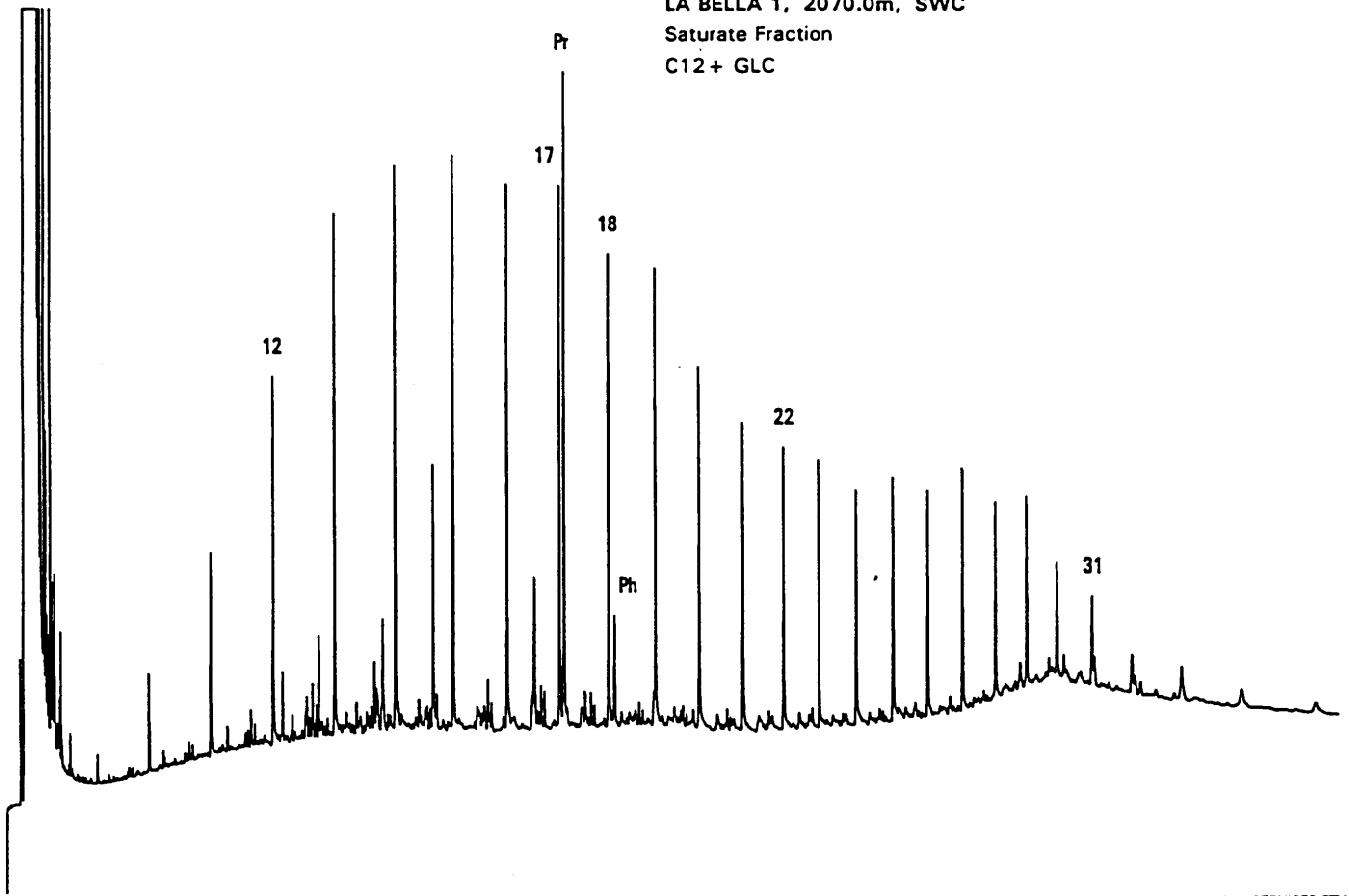


Figure 21

FIGURE 22a

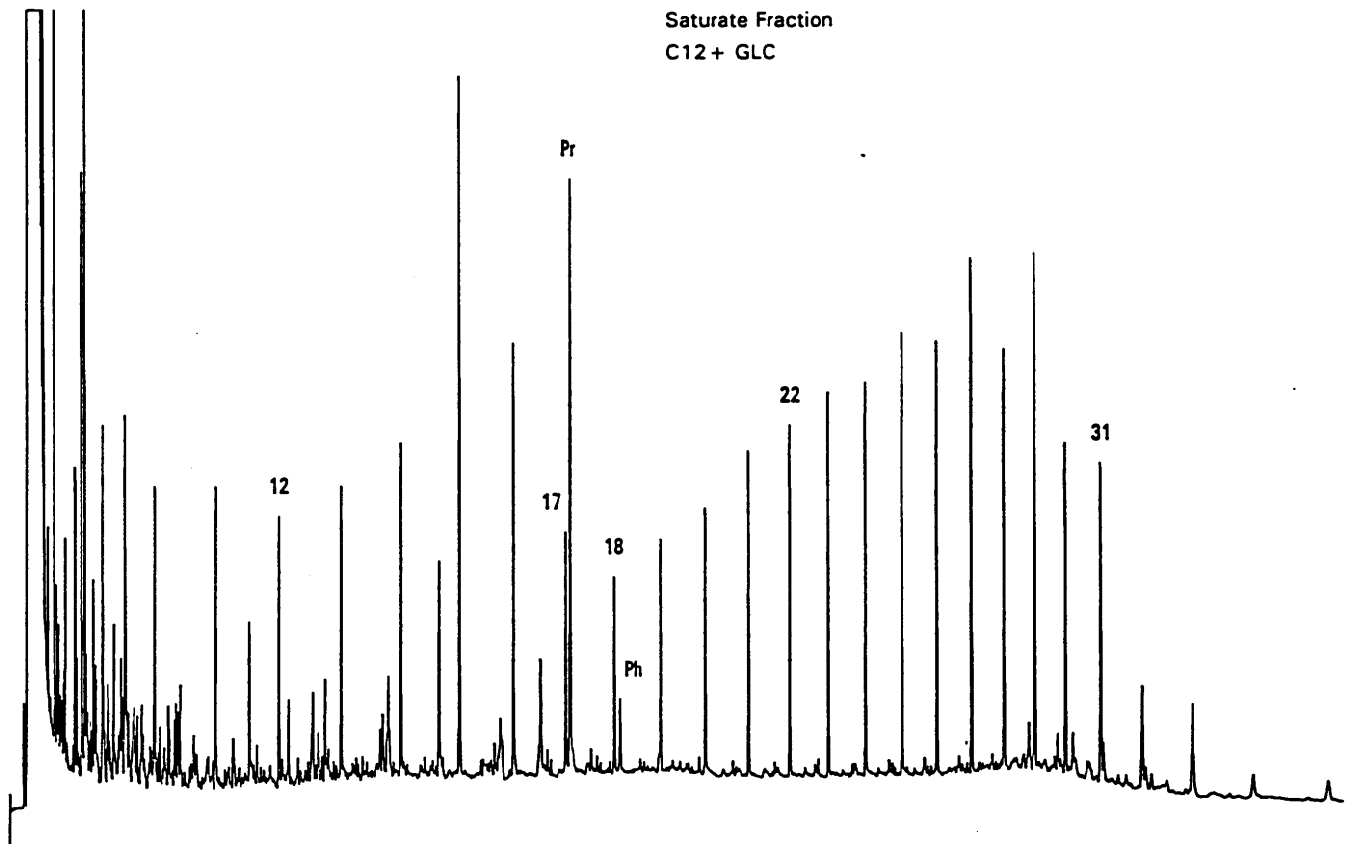
LA BELLA 1, 2070.0m, SWC
Saturate Fraction
C12 + GLC



1344014

GEOTECHNICAL SERVICES PTY LTD

LA BELLA 1, 2097.7m, Core
Saturate Fraction
C12 + GLC

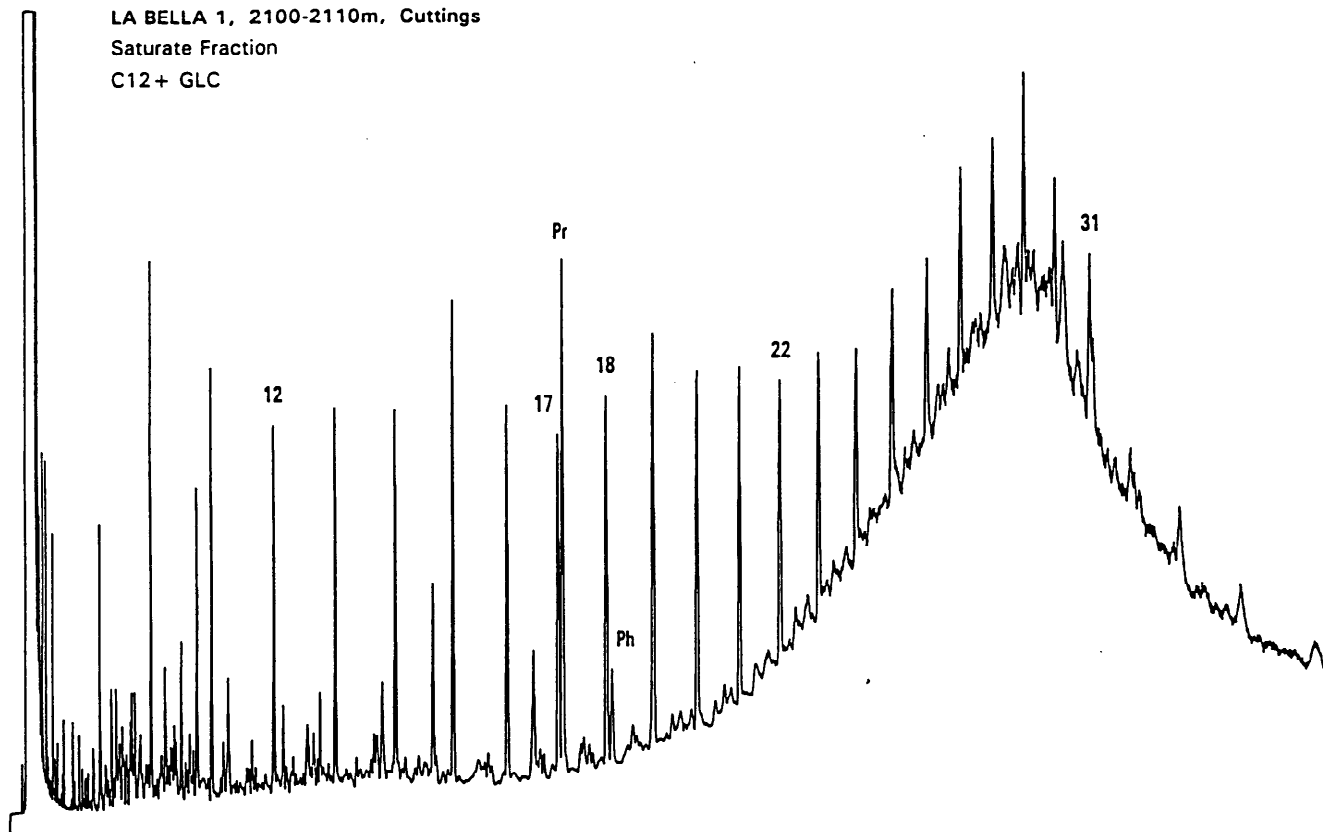


1344014

GEOTECHNICAL SERVICES PTY LTD

FIGURE 22b

LA BELLA 1, 2100-2110m, Cuttings
Saturate Fraction
C12+ GLC



1944013

GEOTECHNICAL SERVICES PTY LTD

LA BELLA 1, 2121.0m, SWC
Saturate Fraction
C12+ GLC

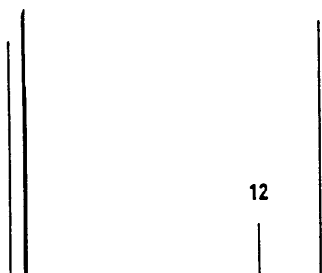
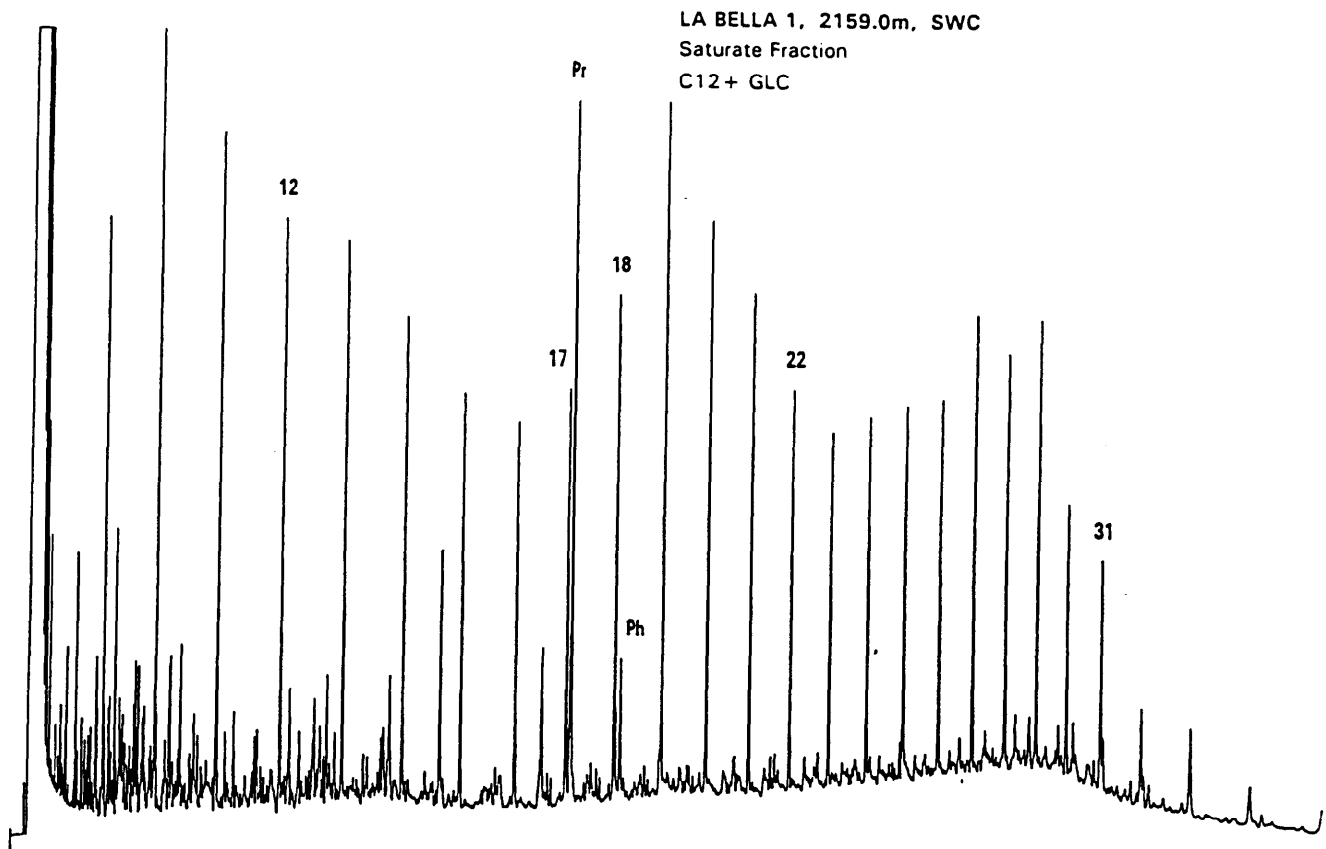


FIGURE 22c



1994/07

TABLE 9

SUMMARY OF GAS CHROMATOGRAPHY DATA - SEDIMENTS
ALKANE DISTRIBUTIONS

WELL NAME = LA BELLA-1
COUNTRY = Australia
BASIN = Otway

DEPTH UNIT = Metres
DATE OF JOB = Oct 93

DEPTH 1	DEPTH 2	nC12	nC13	nC14	TMTD	nC15	nC16	iC18	nC17	iC19	nC18	iC20	nC19	nC20	nC21	nC22	nC23	nC24	nC25	nC26	nC27	nC28	nC29	nC30	nC31	nC32	nC33
2070.00	2070.00	3.9	5.8	6.3	3.0	6.8	6.0	3.0	6.0	9.2	5.3	1.6	5.1	4.4	3.8	3.3	2.7	3.1	3.1	2.9	3.2	3.4	2.7	2.1	1.4	.8	1.0
2071.20	2071.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2095.15	2095.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2097.70	2097.70	2.7	3.0	3.6	2.6	7.4	5.4	2.3	2.9	8.1	2.2	1.1	2.4	2.8	3.4	3.7	4.1	4.2	4.9	4.6	5.6	4.7	5.7	3.8	4.5	1.8	2.3
2100.00	2110.00	3.5	3.8	4.4	2.3	5.8	4.7	2.4	5.0	6.6	5.6	1.3	7.1	5.4	5.6	4.5	4.3	3.6	3.6	3.1	3.5	3.2	3.3	2.0	2.6	.9	1.8
2102.50	2102.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2121.00	2121.00	13.1	18.3	9.9	3.0	6.4	6.2	3.1	5.6	5.5	4.2	1.3	3.2	2.6	2.2	2.1	2.0	1.8	1.8	1.5	1.5	1.4	1.1	.8	.7	.3	.4
2159.00	2159.00	4.9	4.7	4.2	2.6	3.8	3.8	2.5	4.4	8.3	5.3	1.5	5.6	5.2	4.4	3.9	3.3	3.5	3.6	3.8	4.4	4.1	4.2	2.6	2.6	1.2	1.5

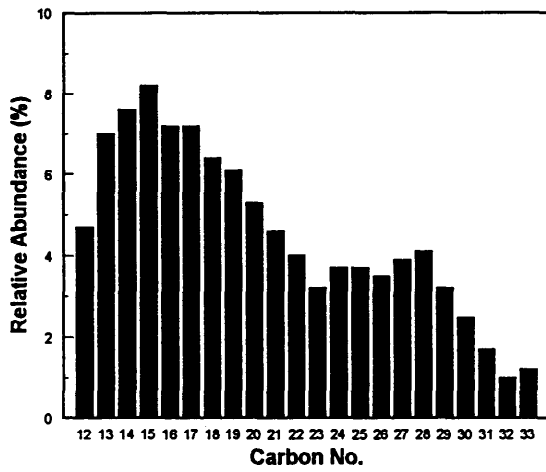
i = iso

n = normal

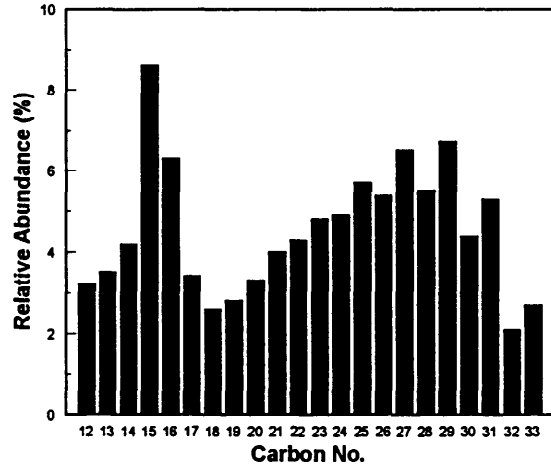
- = no data

TMTD = Trimethyltridecane

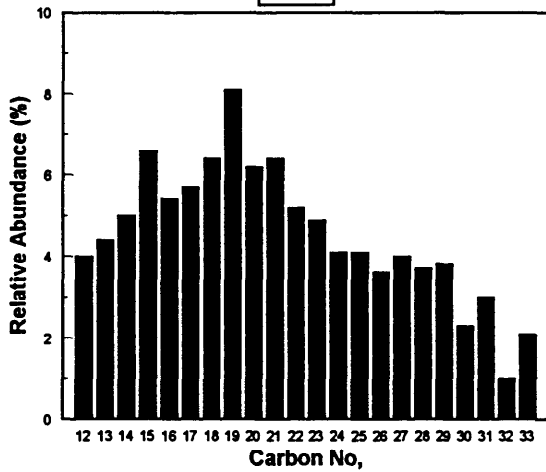
N.B. Values are relative %



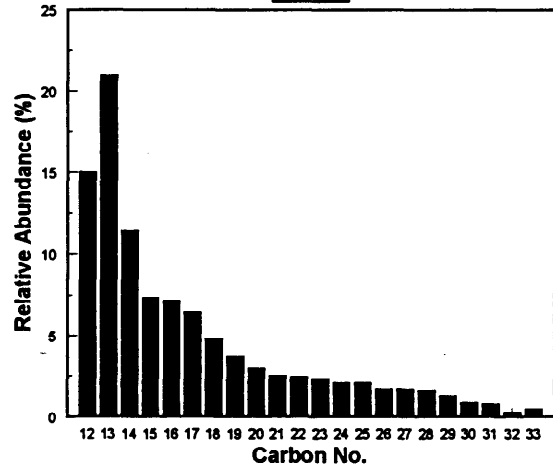
2070m



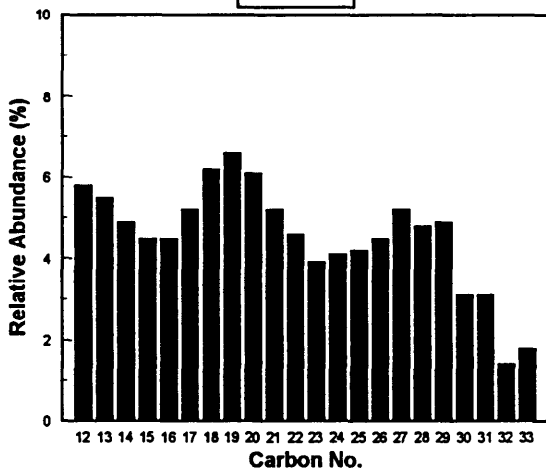
2097m



2100 - 2110m



2121m



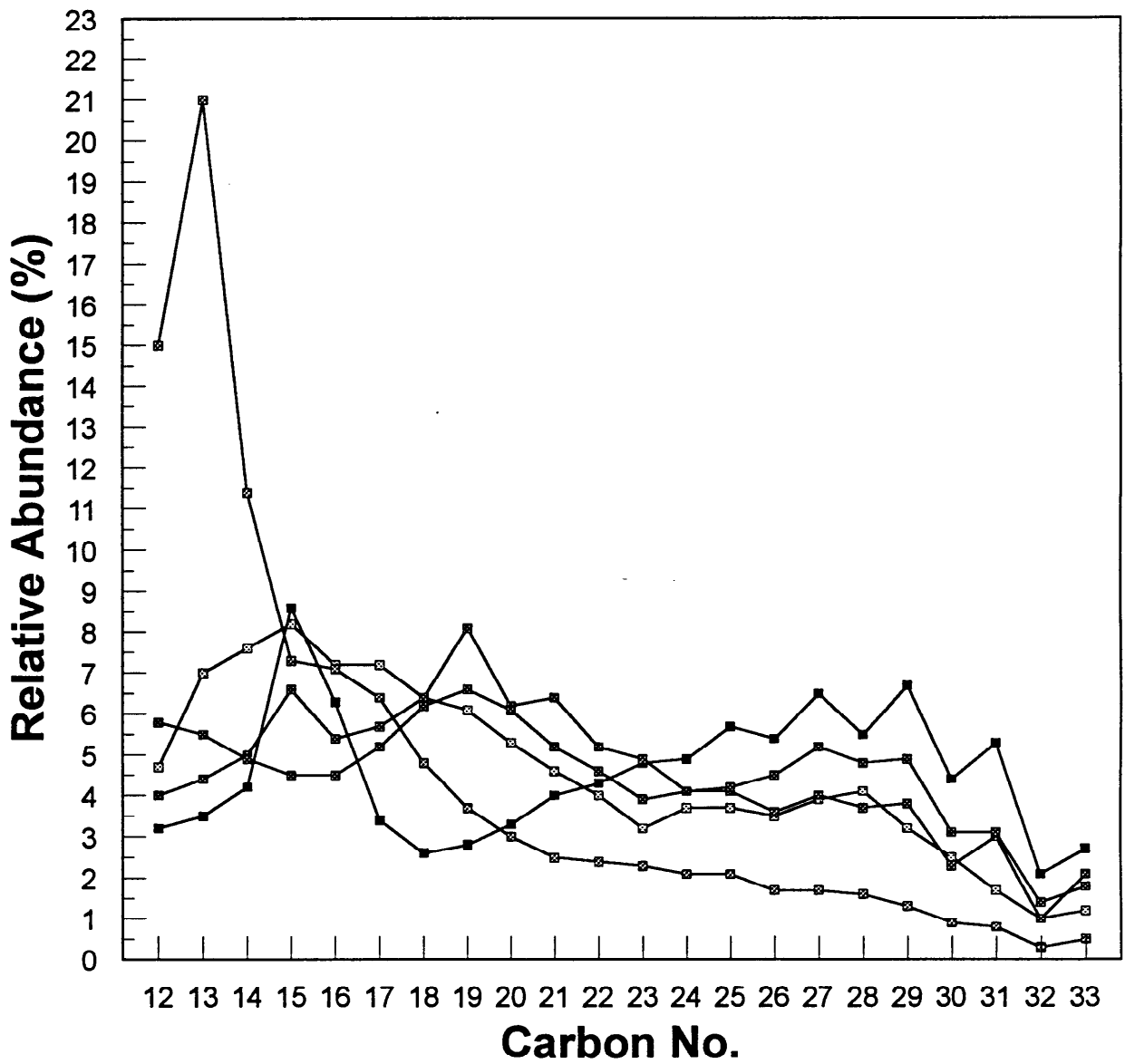
2159m

LA BELLA - 1: Extracts
GC (Sats) Normalised Relative Abundance

Figure 23

LA BELLA - 1: Extracts

GC (Sats) Normalised Relative Abundance



2070m	2097m	2100 - 2110m	2121m	2159m
—□—	—■—	—■—	—□—	—■—

Figure 24

TABLE 10

SUMMARY OF GAS CHROMATOGRAPHY DATA - CONDENSATES
 ALKANE COMPOSITIONAL DATA

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1	DEPTH 2	ANALYSIS TYPE	PRISTANE/PHYTANE	PRISTANE/n-C17	PHYTANE/n-C18	TMTD/PRISTANE	CPI(I)	CPI(II)	(C21+C22)/(C28+C29)
2072.80	2072.80	SF	8.26	2.54	0.44	0.57	0.95	0.95	13.49
2160.50	2160.50	SF	5.56	0.82	0.16	0.72	1.12	1.11	6.32

 CPI = Carbon preference index TMTD = Trimethyltridecane - = data
 SF = Saturate fraction WE = Whole extract

TABLE 11

SUMMARY OF GAS CHROMATOGRAPHY DATA - SEDIMENTS
ALKANE COMPOSITIONAL DATA

=====

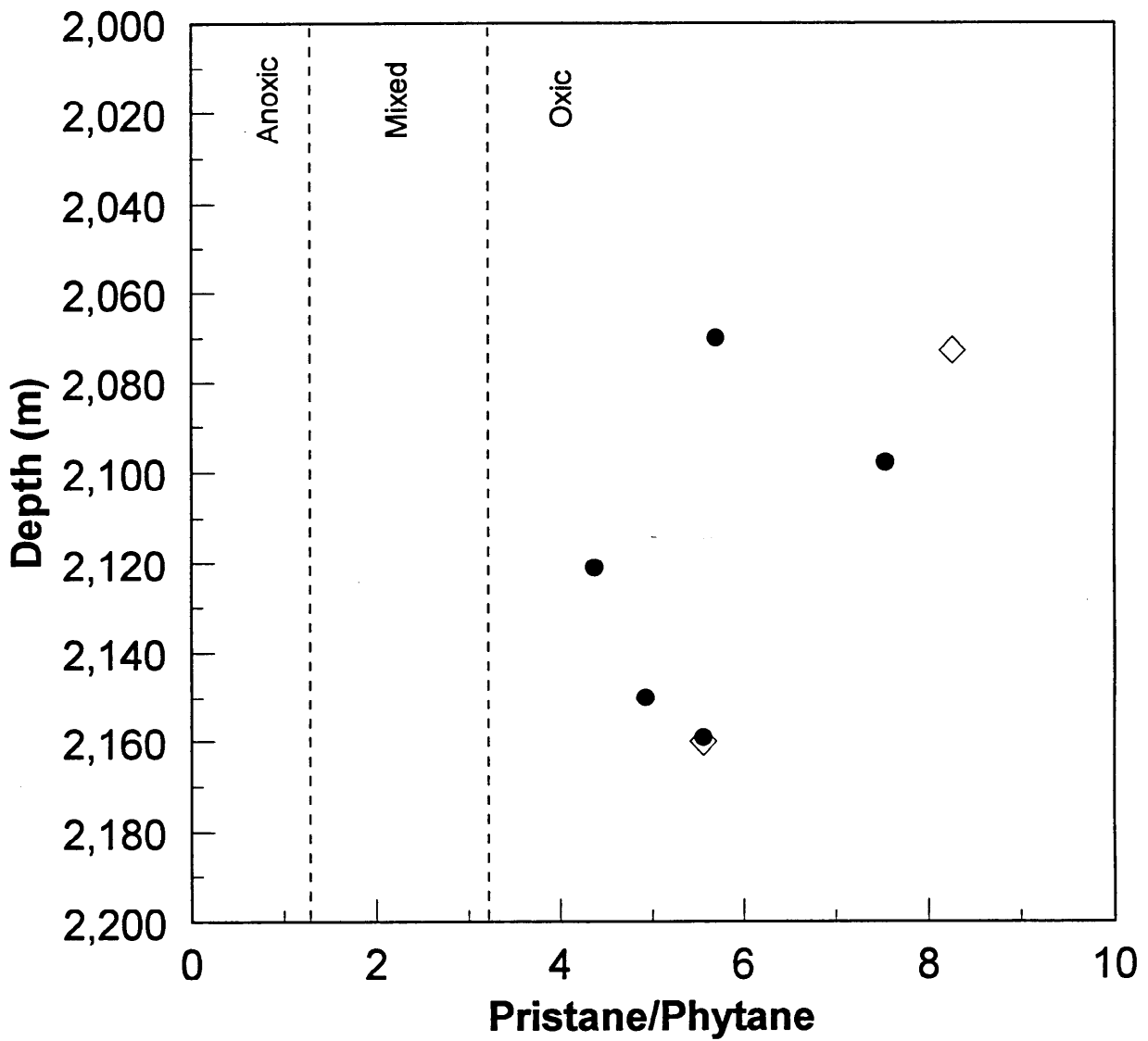
WELL NAME = LA BELLA-1
COUNTRY = Australia
BASIN = Otway

DEPTH 1	DEPTH 2	ANALYSIS TYPE	PRISTANE/PHYTANE	PRISTANE/n-C17	PHYTANE/n-C18	TMTD/PRISTANE	C
2070.00	2070.00	SF	5.70	1.53	0.30	0.33	-
2071.20	2071.20	WE	-	-	-	-	-
2095.15	2095.20	WE	-	-	-	-	-
2097.70	2097.70	SF	7.54	2.78	0.48	0.32	-
2100.00	2110.00	SF	4.93	1.31	0.24	0.35	-
2102.50	2102.50	WE	-	-	-	-	-
2121.00	2121.00	SF	4.38	0.97	0.30	0.55	-
2159.00	2159.00	SF	5.56	1.91	0.28	0.31	-

CPI = Carbon preference index TMTD = Trimethyltridecane - = no data
SF = Saturate fraction WE = Whole extract

LA BELLA - 1

Pristane/Phytane vs Depth



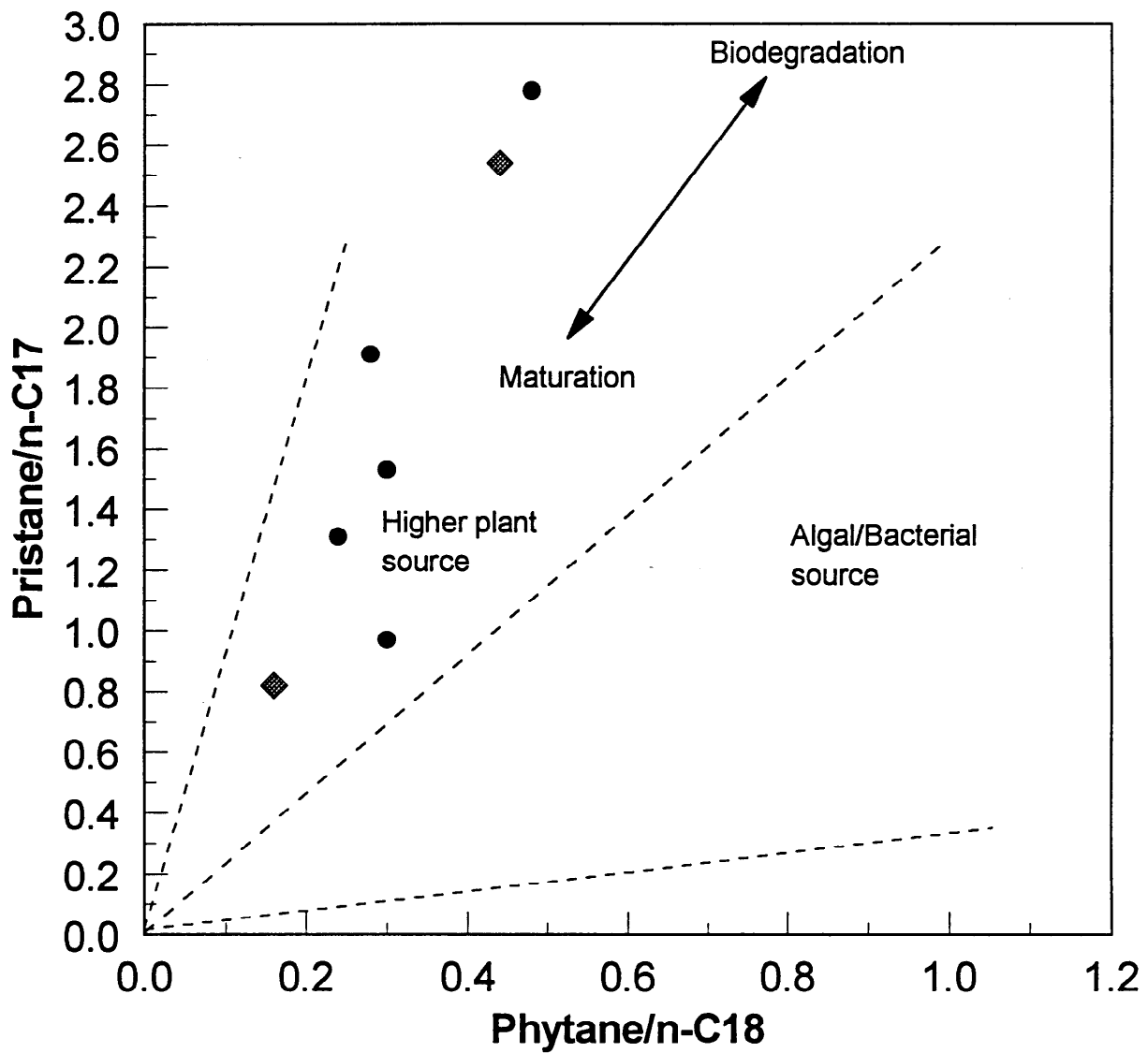
Extract Condensate

● ◇

Figure 25

LA BELLA - 1

Pristane/n-C17 vs Phytane/n-C18

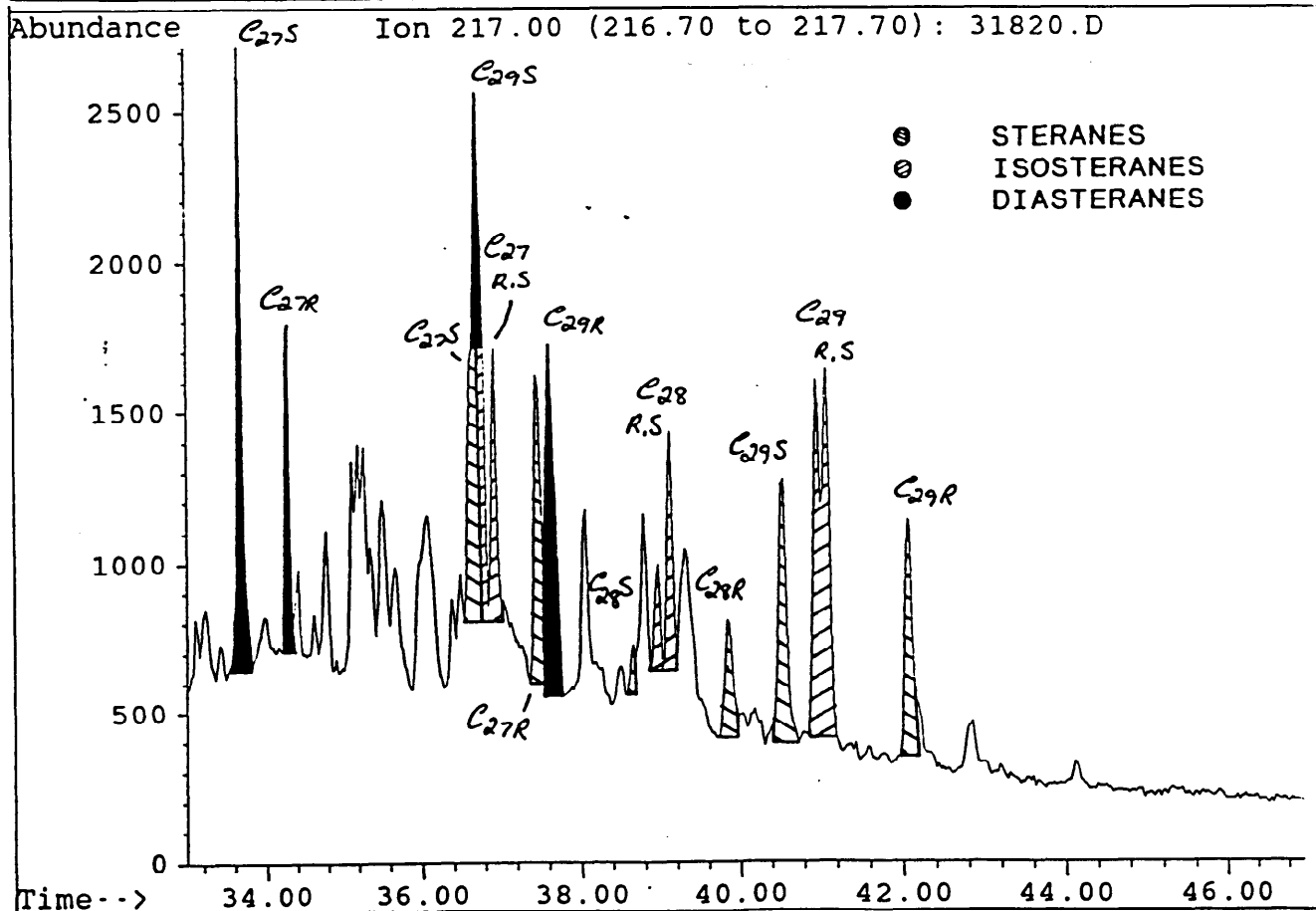
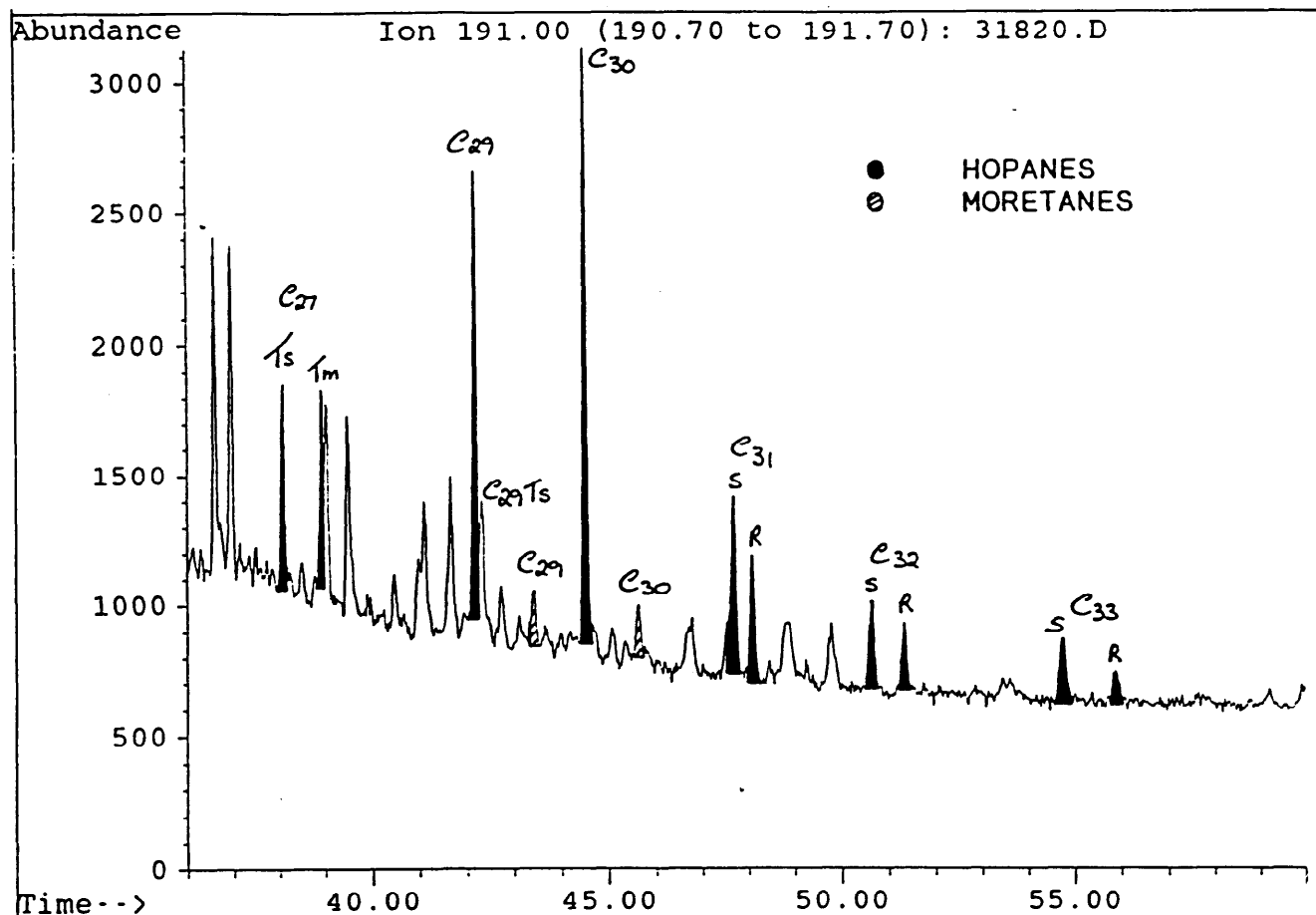


Extract Condensate

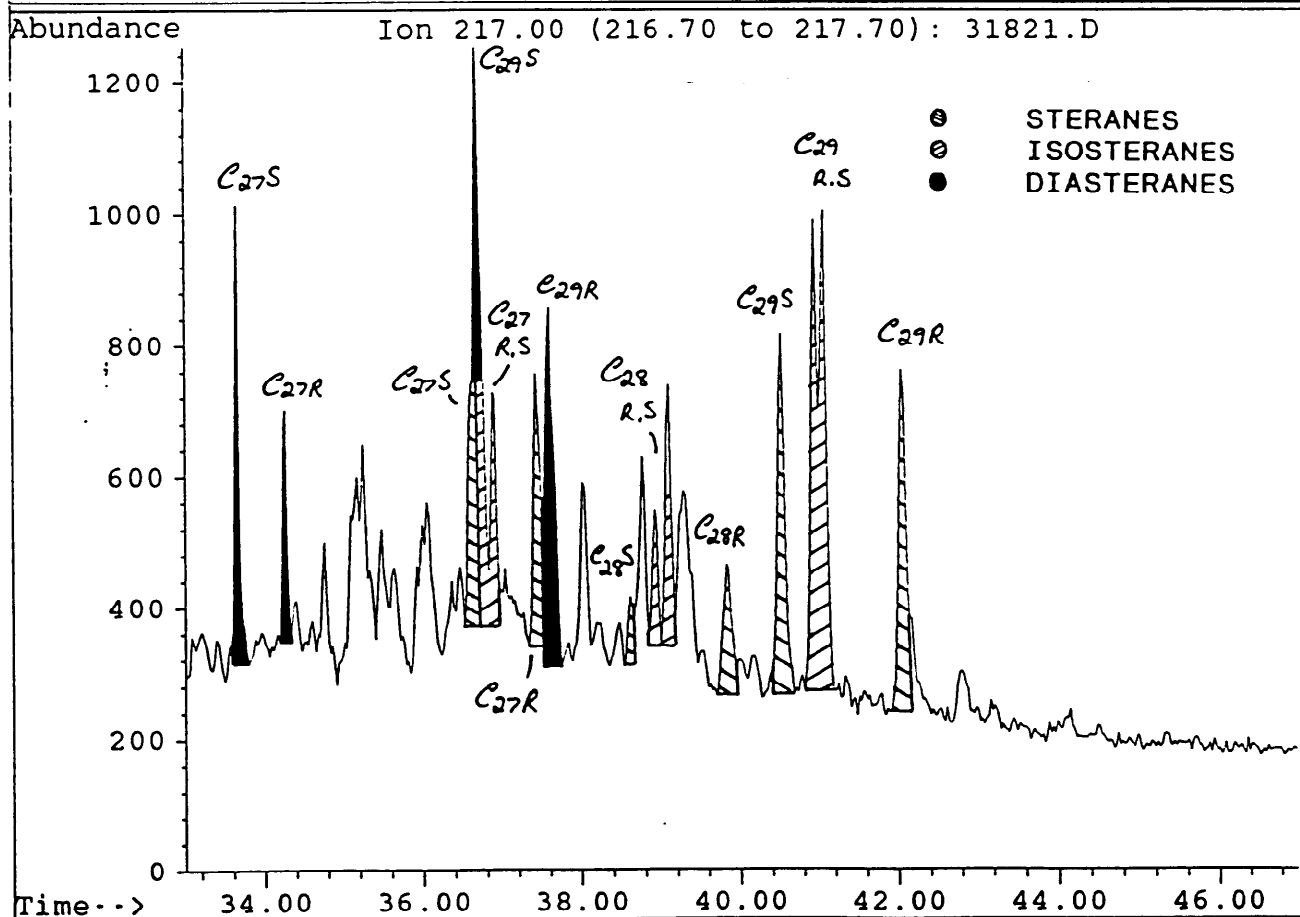
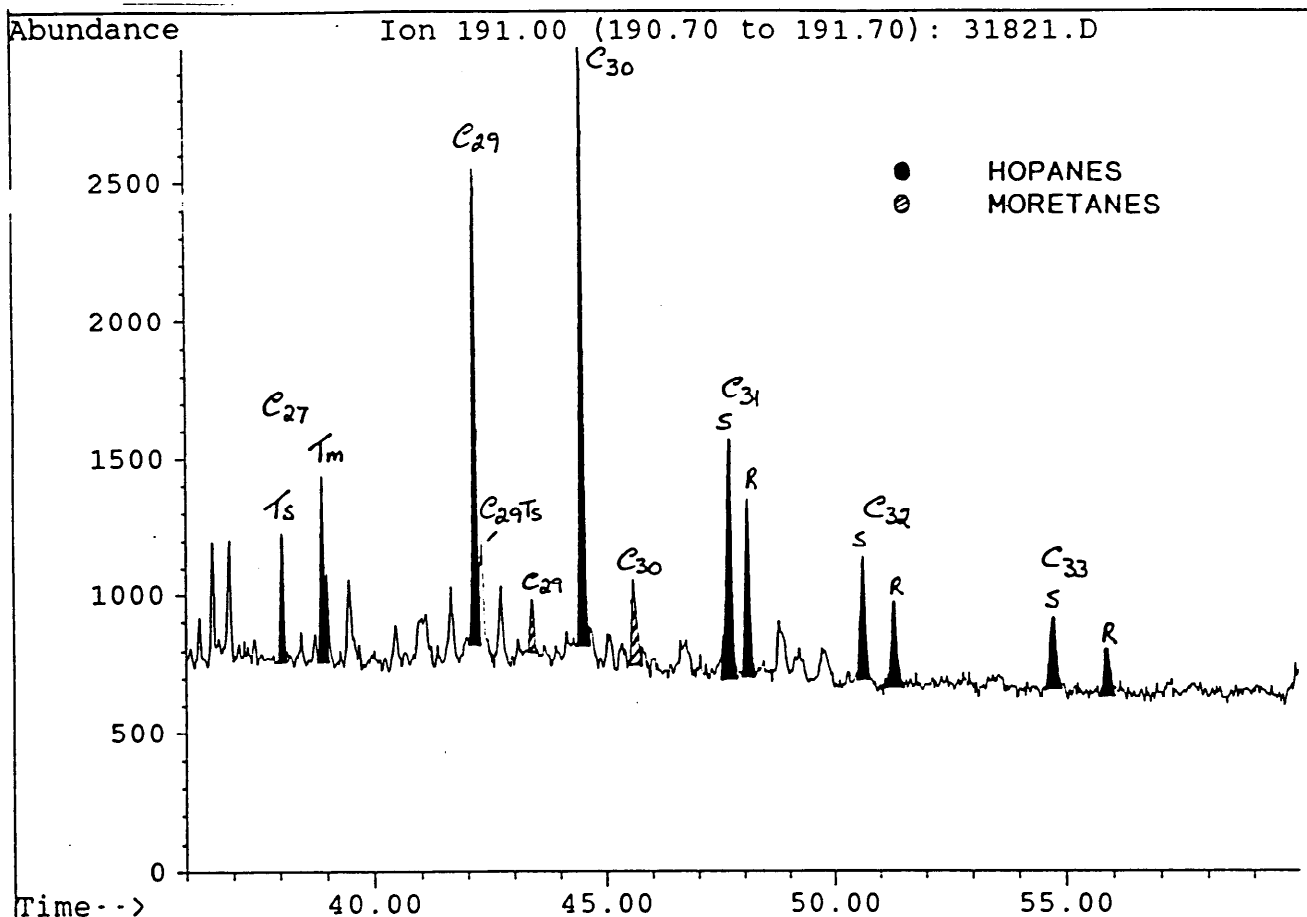


Figure 26

m/z 191 and m/z 217 biomarker traces: 2072.8m condensate



m/z 191 and m/z 217 biomarker traces: 2160.5m condensate



m/z 191 and m/z 217 biomarker traces: 2070m extract

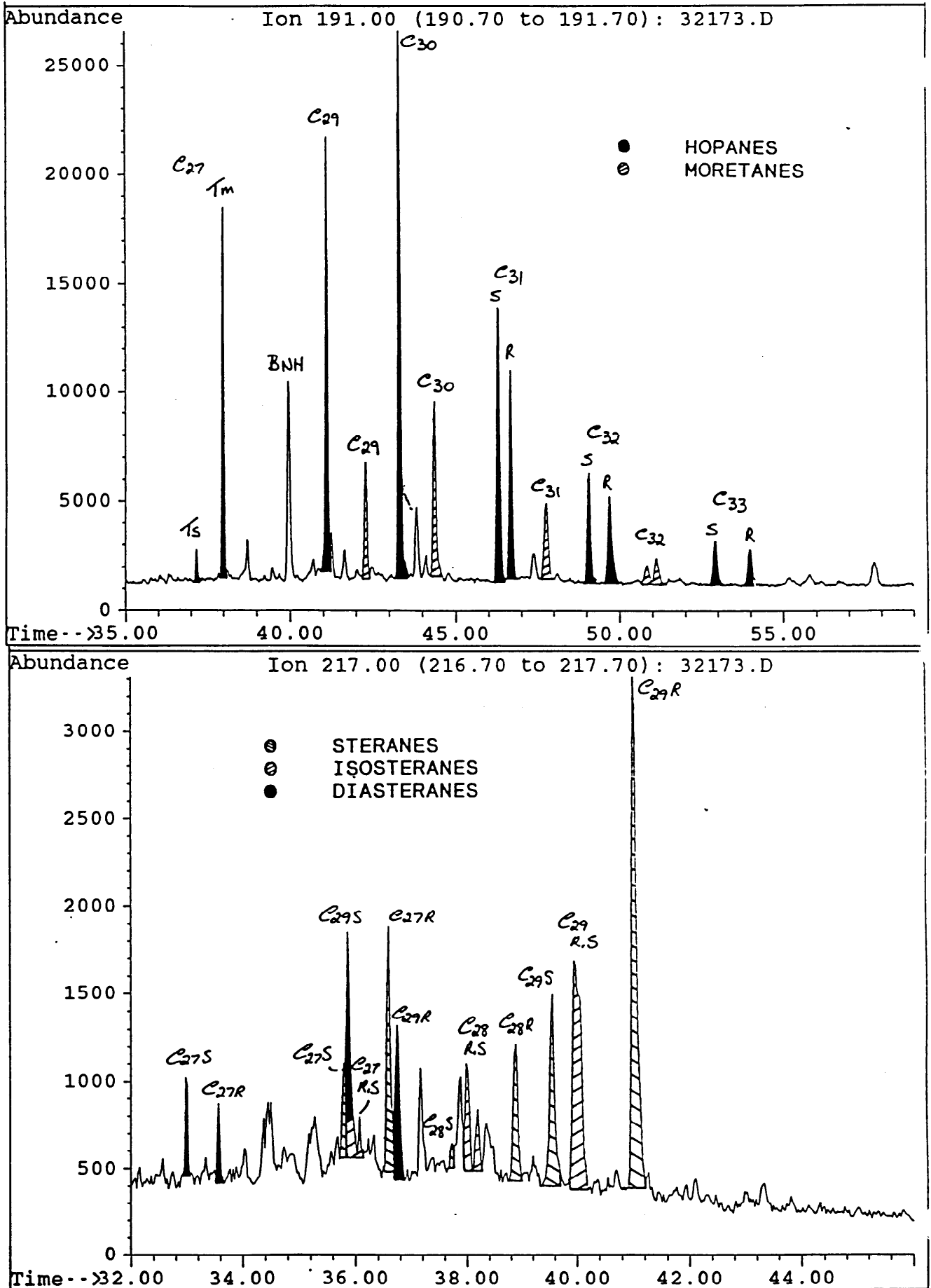


FIGURE 30

m/z 191 and m/z 217 biomarker traces: 2097.7m extract

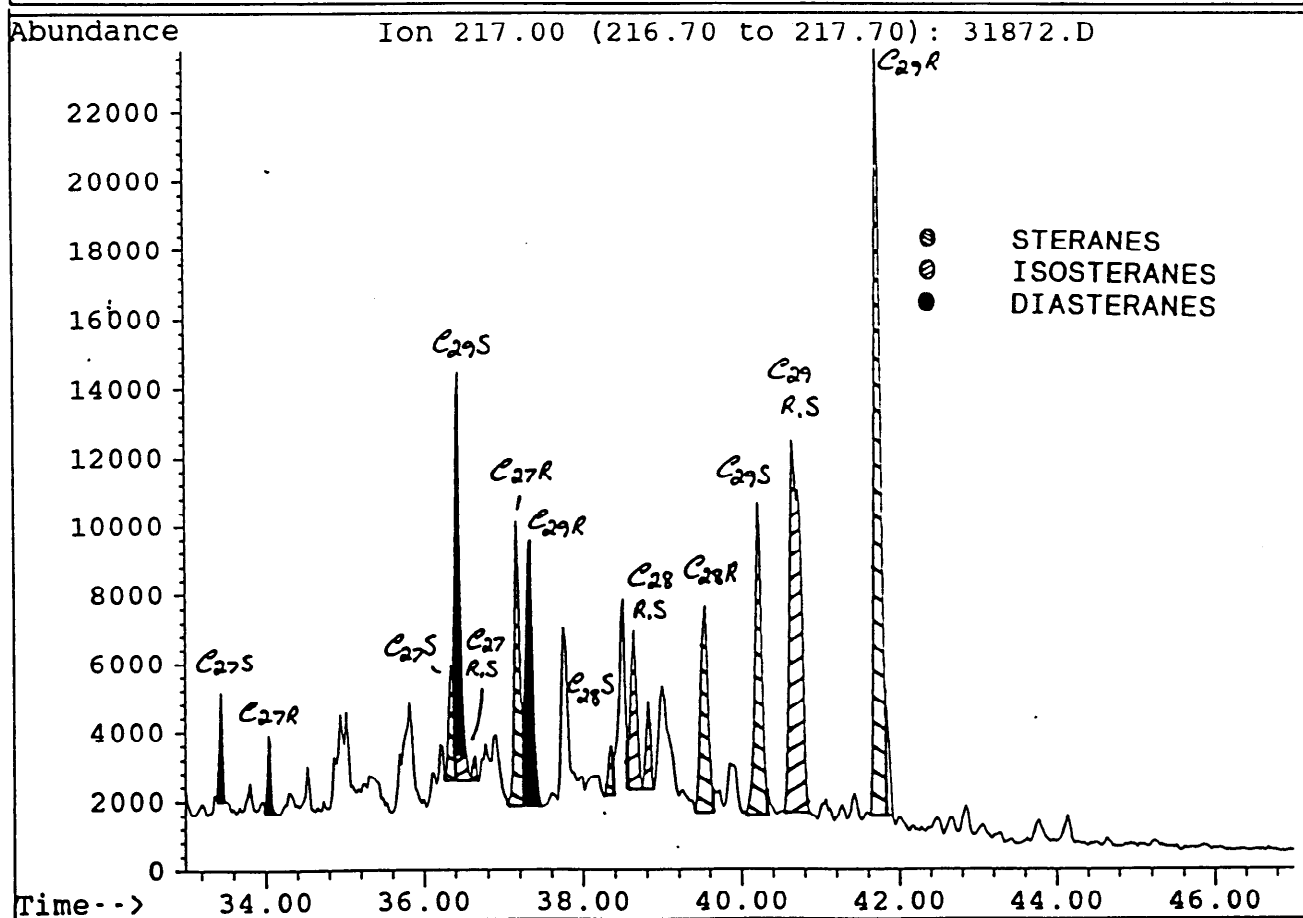
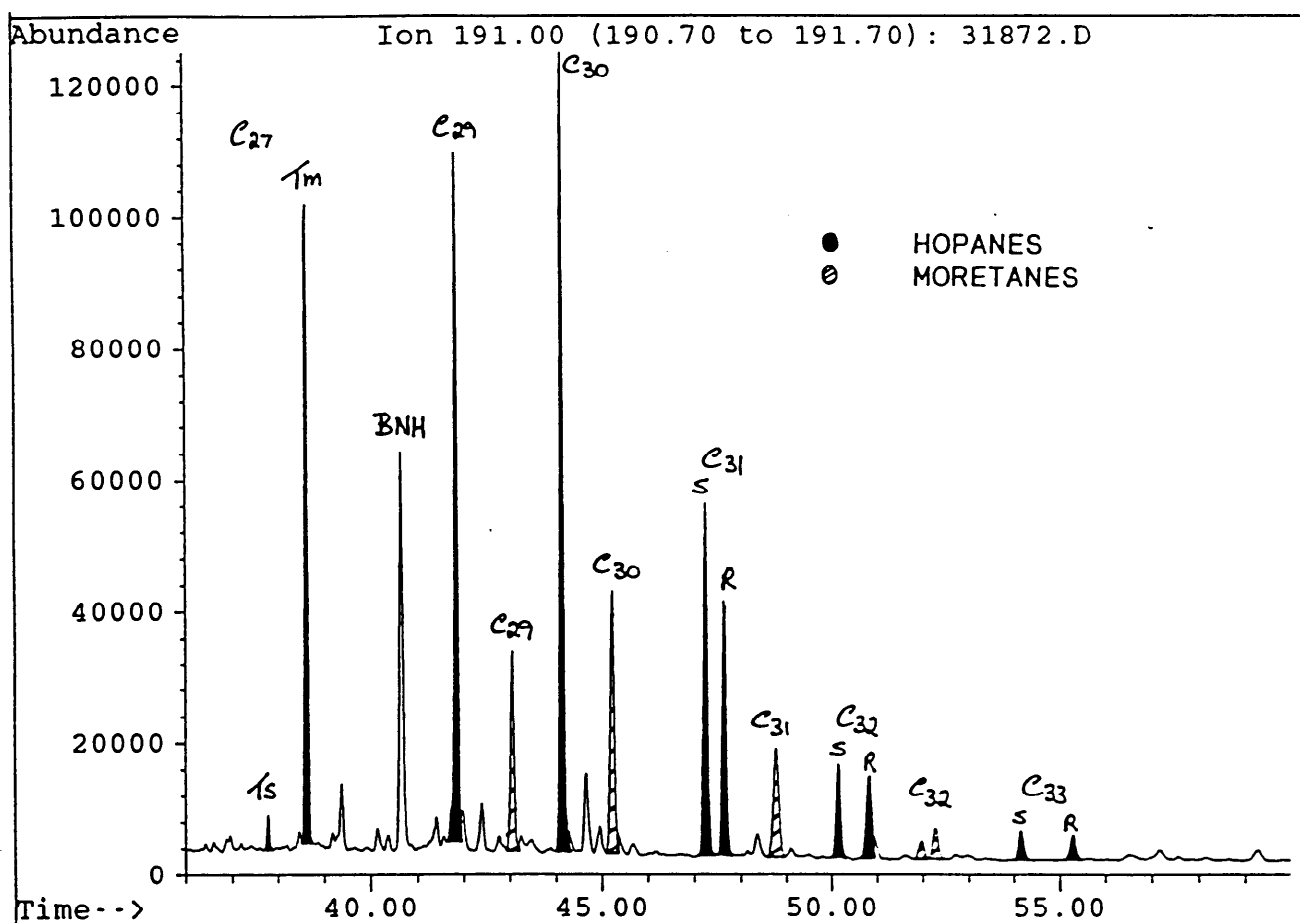
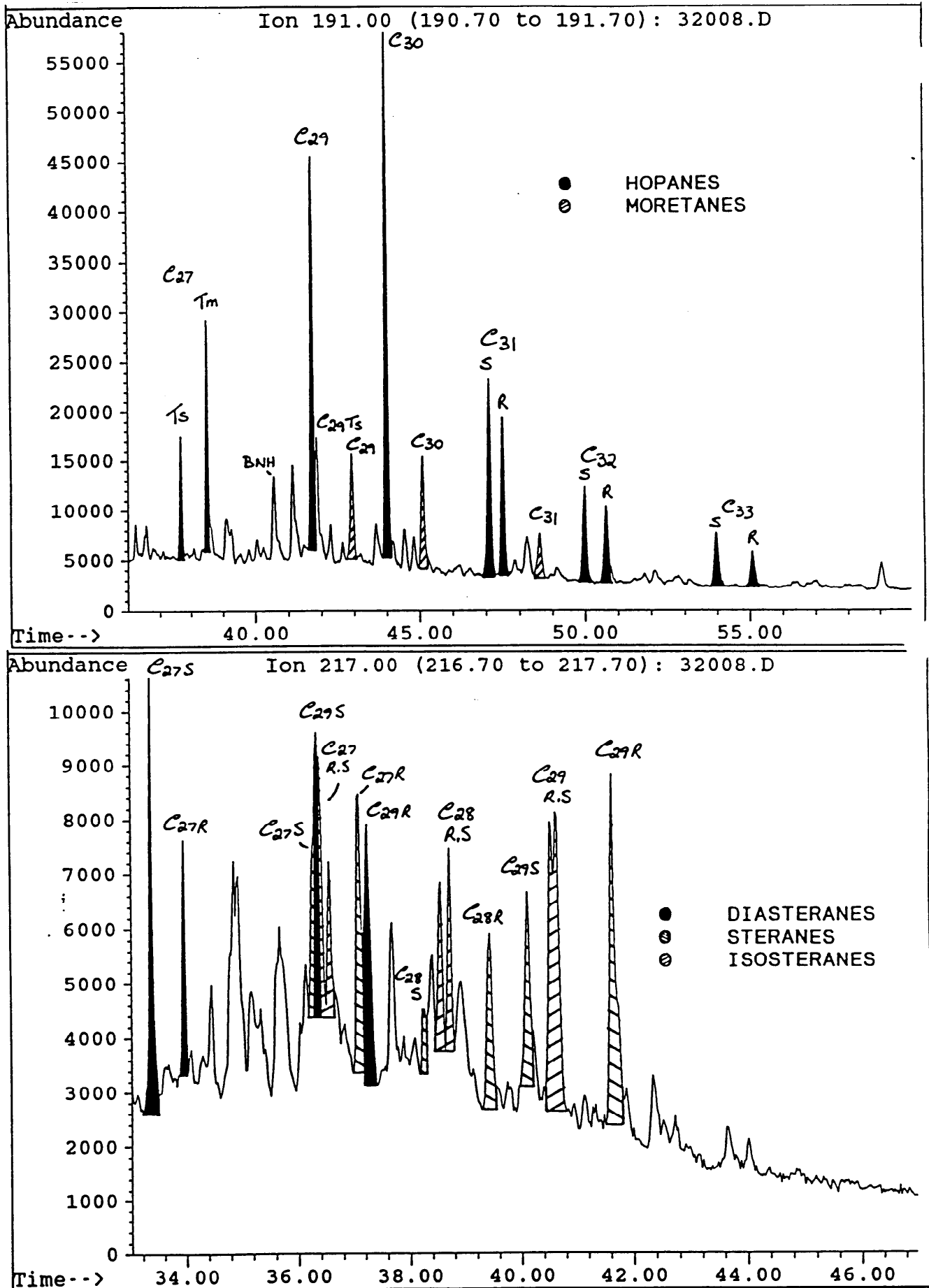
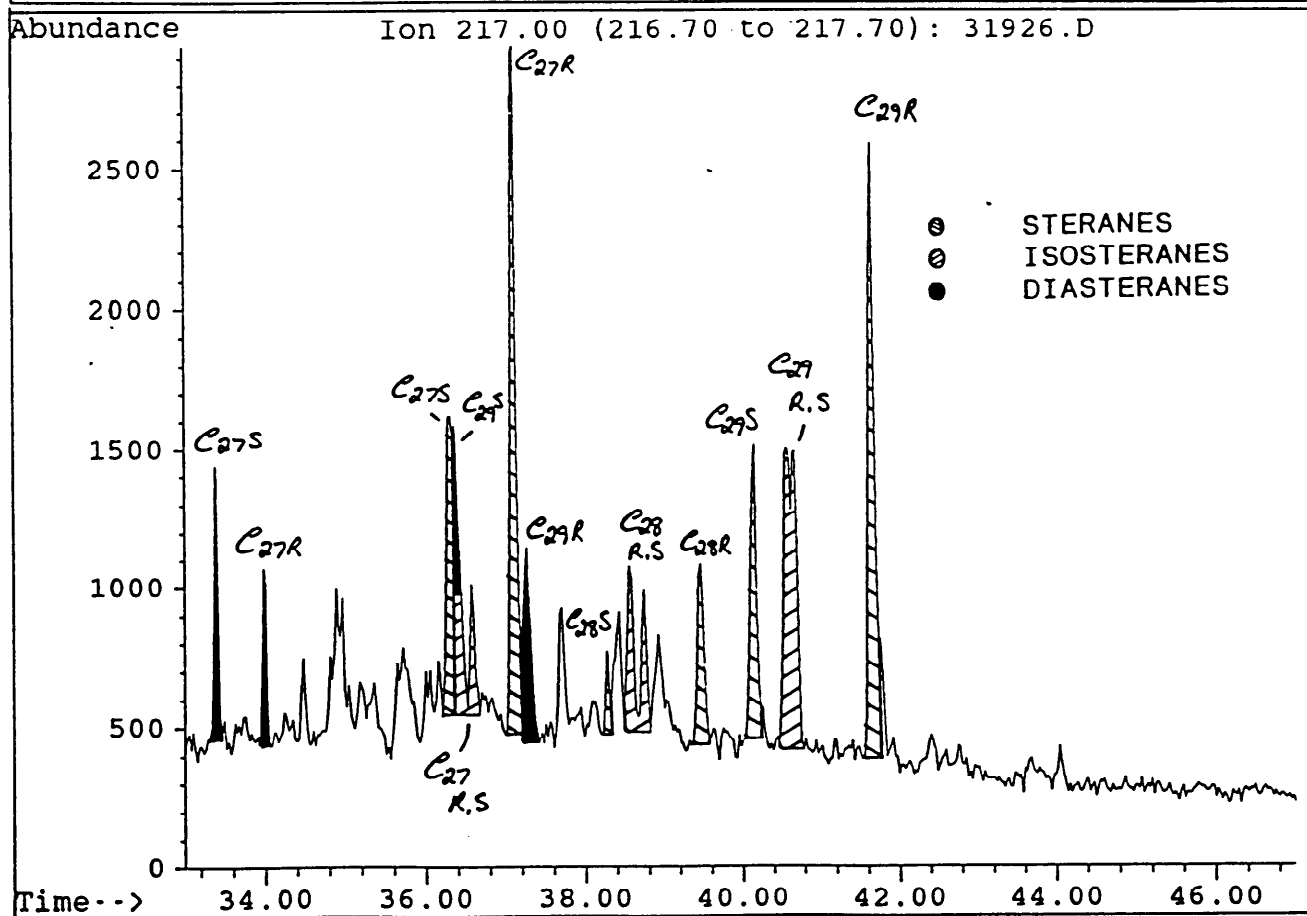
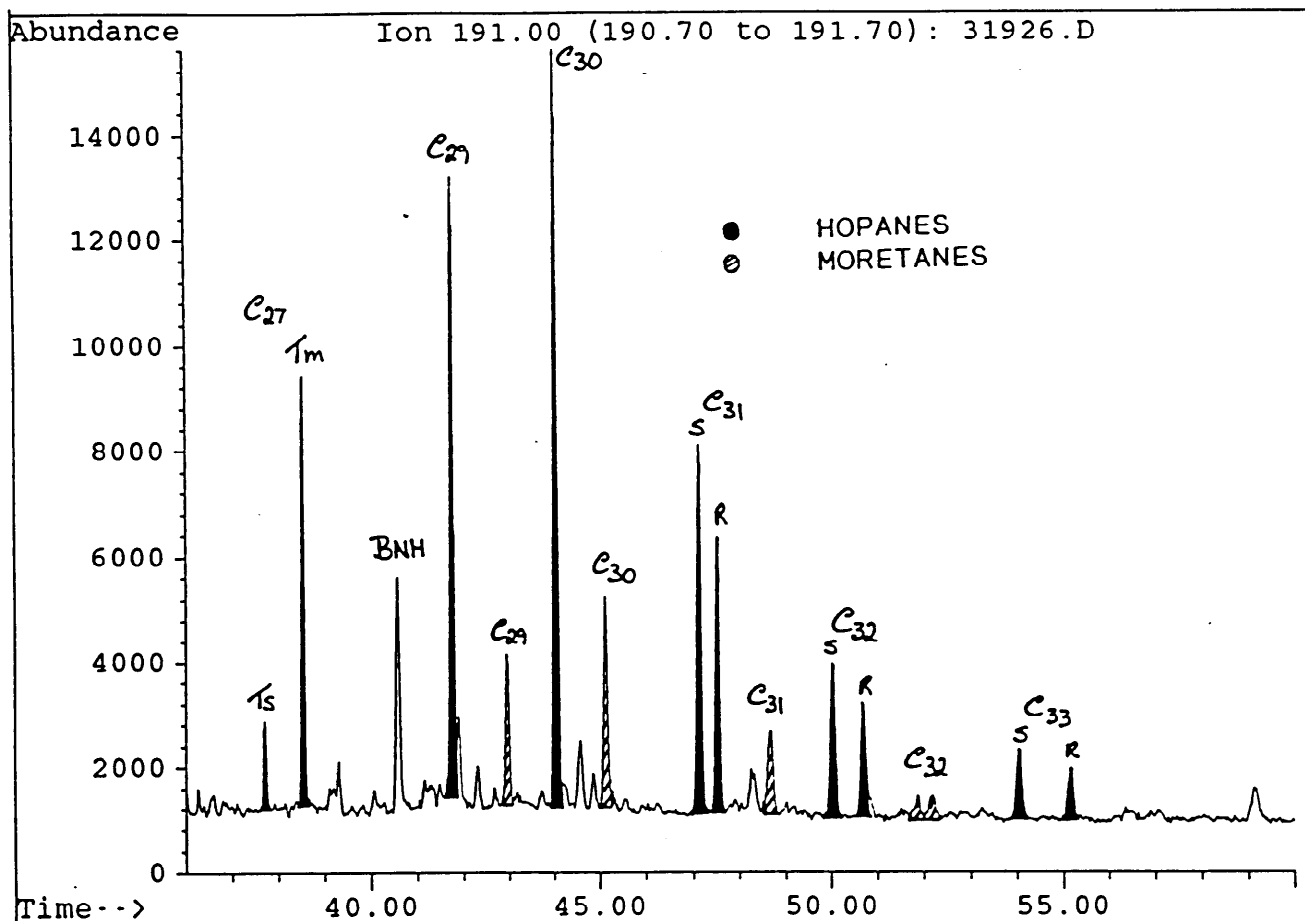


FIGURE 31

m/z 191 and m/z 217 biomarker traces: 2100-2110m extract



m/z 191 and m/z 217 biomarker traces: 2121m extract



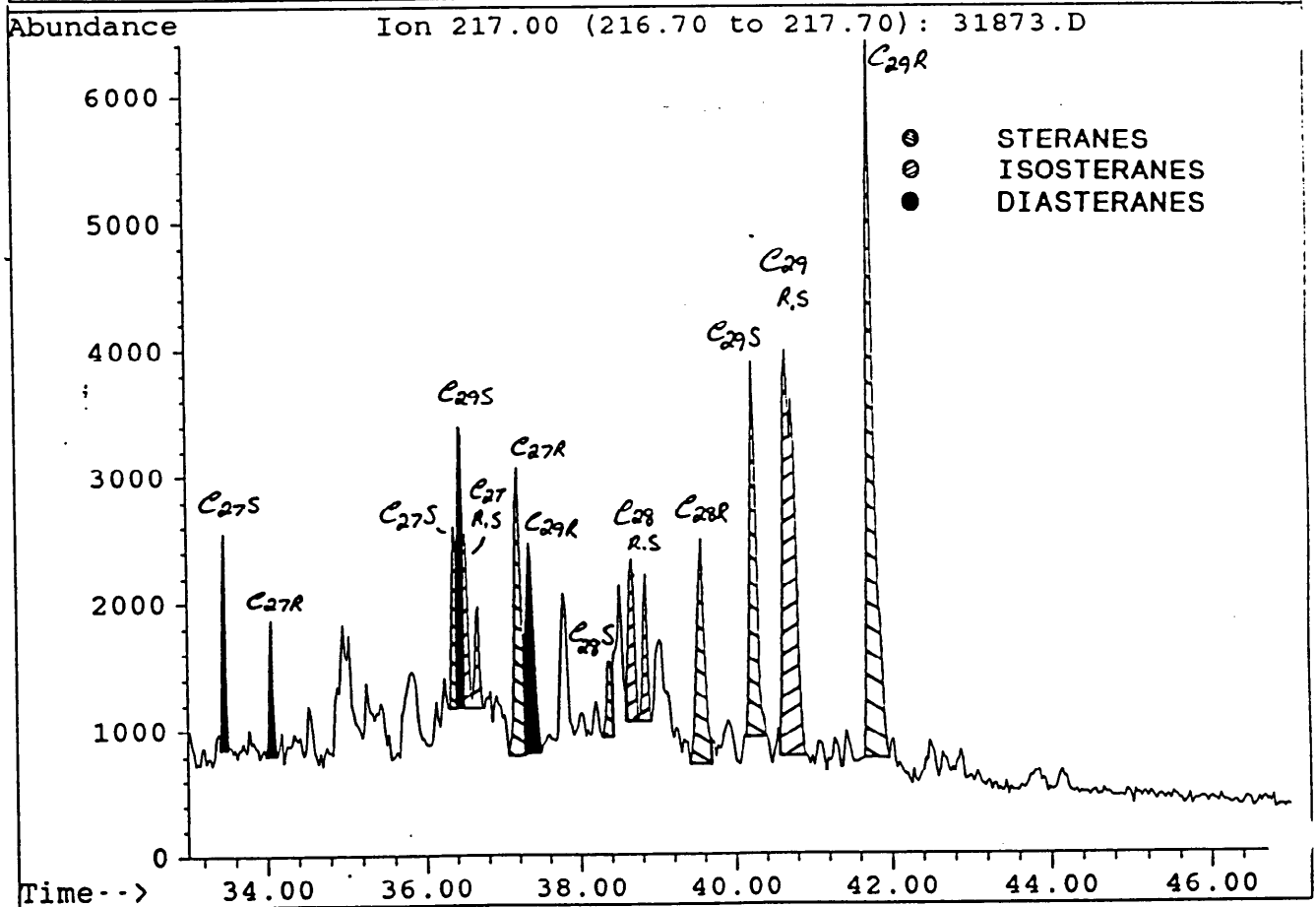
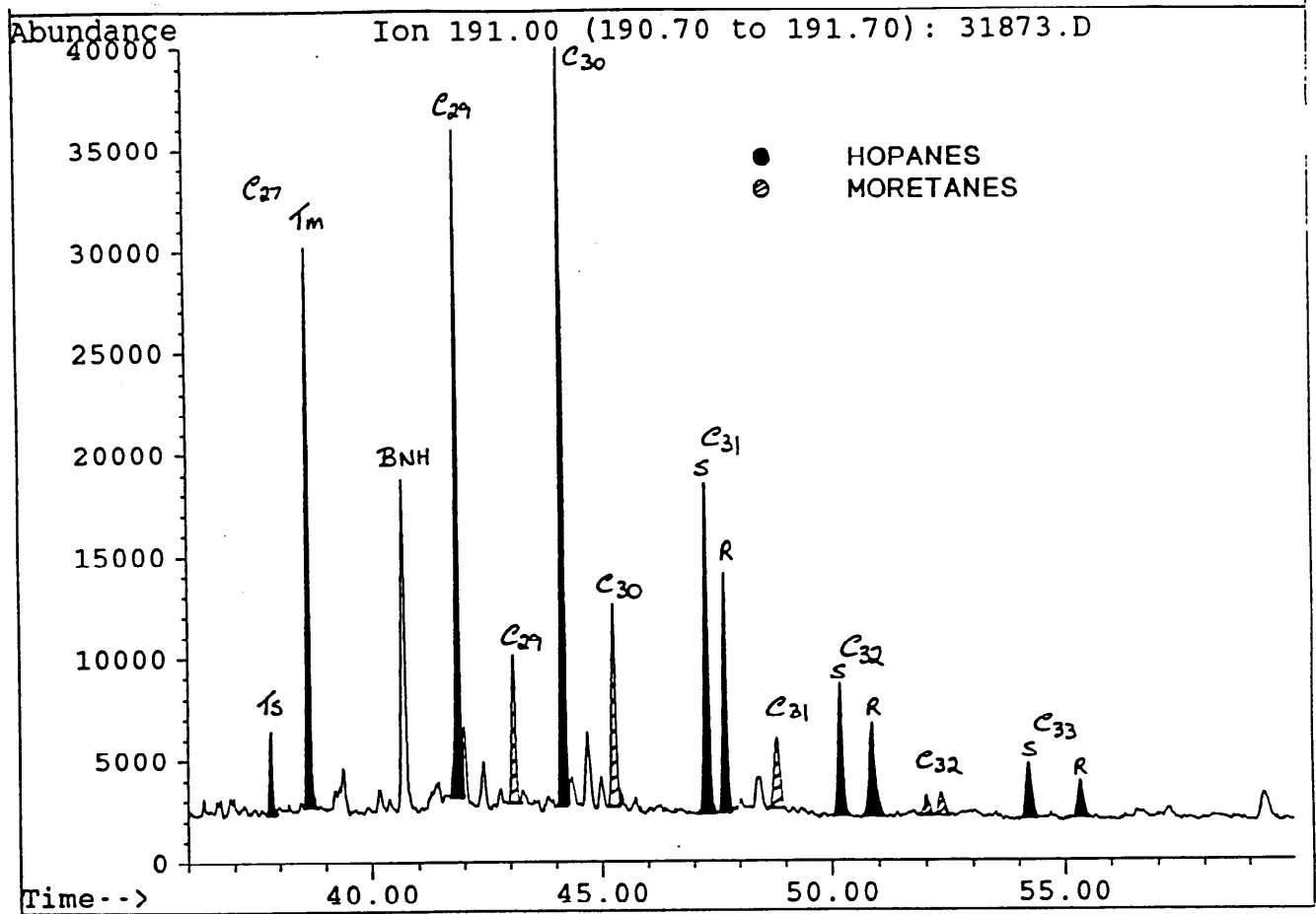


TABLE 12-1

WELL - LA BELLA-1		SATURATE FRACTION SIR GC/MS DATA - OILS		DEPTH UNIT - Metres	
COUNTRY - Australia		DETAILED COMPOUND ANALYSIS		DATE OF JOB - Oct 93	
BASIN - Otway		DESCRIPTION : RFT SAMPLE			
		DEPTH 1 - 2072.80		DEPTH 2 - 2072.80	
COMPOUND	ION	RELATIVE AMOUNT	COMPOUND	ION	RELATIVE AMOUNT
C23 Tricyclic	191	1953.0	C24 Tricyclic	191	1336.0
C25 Tricyclic	191	814.0	C26 Tricyclic	191	1122.0
C28 Tricyclic	191	1268.0	C29 Tricyclic	191	1073.0
C24 Tetracyclic	191	803.0			
C27 Hopane (Ts)	191	766.0	C27 Hopane (Tm)	191	834.0
C27 Hopane (17B)	191	-			
C28 Hopane (25,30)	191	-	C28 Hopane (28,30)	191	-
C29 Hopane	191	1686.0	C29 Moretane	191	217.0
C29 Demeth. Hopane	191	-	C29 Hopane (BB)	191	-
C30 Hopane	191	2284.0	C30 Moretane	191	151.0
C30 Hopane (BB)	191	-			
C31S Hopane	191	715.0	C31R Hopane	191	496.0
C31S+R Hopane (BB)	191	-	C31S+R Moretane	191	-
C32S Hopane	191	342.0	C32R Hopane	191	267.0
C32S+R Hopane (BB)	191	-	C32S+R Moretane	191	-
C33S Hopane	191	-	C33R Hopane	191	-
Gammacerane	191	-	Oleanane (18a)	191	-
Unknown 1	191	-	Unknown 2	191	151.0
Unknown 3	191	461.0	Unknown 4	191	239.0
C27 Demeth. Hopane	177	-	C28 Demeth. Hopane	177	-
C29 Hopane	177	-	C29 Demeth. Hopane	177	-
C29 Moretane	177	-	C29 Hopane (BB)	177	-
Unknown 3	177	-			
C30 2-Methylhopane	205	-	C31 2-Methylhopane	205	-
C31S Hopane	205	-	C31R Hopane	205	-
C31S+R Moretane	205	-	C31S+R Hopane (BB)	205	-
C21 Sterane	217	-	C22 Sterane	217	-
C27S Normal Sterane	217	-	C27R Normal Sterane	217	1034.0
C27S Isoesterane	217	-	C27R Isoesterane	217	-
C27S Diasterane	217	-	C27R Diasterane	217	-
C28S Normal Sterane	217	168.0	C28R Normal Sterane	217	394.0
C28S Isoesterane	217	-	C28R Isoesterane	217	-
C28S Diasterane	217	-	C28R Diasterane	217	-
C29S Normal Sterane	217	880.0	C29R Normal Sterane	217	792.0
C29S Isoesterane	217	1281.0	C29R Isoesterane	217	1231.0
C29S Diasterane	217	1770.0	C29R Diasterane	217	1176.0
C27S+R Isoesterane	218	3773.0	C28S+R Isoesterane	218	1856.0
C29S+R Isoesterane	218	4153.0			
C27S Diasterane	259	1101.0	C27R Diasterane	259	581.0
C28S Diasterane	259	672.0	C28R Diasterane	259	486.0
C29S Diasterane	259	920.0	C29R Diasterane	259	645.0
16a Phyllocladane	123	-	16B Phyllocladane	123	717.0
Beyerene	123	354.0	Labdane	123	-
Fichtelite	123	-	Rimuanane	123	-
Nortetracyclane	123	434.0	Pimerane	123	-
Isopimerane	123	-	Kaurane	123	-
Norisopimerane	123	657.0	Unknown 1	123	-
Drimane	123	4493.0	Homodrimane	123	7358.0
Rearranged Drimane 1	123	6985.0	Rearranged Drimane 2	123	3201.0
Eudesmane	123	-			
C15 Alkylcyclohexane	83	-	C17 Alkylcyclohexane	83	-
C21 Alkylcyclohexane	83	-	C22 Alkylcyclohexane	83	-
C25 Alkylcyclohexane	83	-	C29 Alkylcyclohexane	83	-

- = no data IUPAC names corresponding to common names used here are shown at the end of the tables

TABLE 12-2

SATURATE FRACTION SIR GC/MS DATA - OILS

CALCULATED DATA

DESCRIPTION : RFT SAMPLE

WELL = LA BELLA-1 DEPTH 1(m) = 2072.80 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2(m) = 2072.80 DATE OF JOB = Oct 93
 BASIN = Otway

----- TERPANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
* Ts / (Ts + Tm)	191	47.88
* C29 M / (C29 H + C29 M)	191	11.40
* C30 M / (C30 H + C30 M)	191	6.20
* C31S H / (C31S H + C31R H)	191	59.04
* C31S H / (C31S H + C31R H)	205	-
* C32S H / (C32S H + C32R H)	191	56.16
* U1-U4 / (U1-U4 + C30 H)	191	-
* U1 / (U1 + C30 H)	191	-
* U2 / (U2 + C30 H)	191	6.20
* U3 / (U3 + C30 H)	191	16.79
* U4 / (U4 + C30 H)	191	9.47
* C29 H / (C29 H + C30 H)	191	42.47
* C31 2-MeH / (C31 2-MeH + C30 H)	191, 205	-
* C29 BB / (C29 BB + C 29H + C29 M)	191	-
* C29 DeMe / (C29 DeMe + C29H)	177	-
* C28 H's / (C28 H's + C30 H)	191	-
* (Ts + Tm + C28 H's) / C29(H + M) + C30(H + M)	191	-
* Oleanane (18a) / (Oleanane + C30H)	191	-
* Drimane / Homodrimane	123	61.06
* Rea. Drimanes / (Drimane + Homodrimane)	123	85.95
* C22 Alkycyclohex. / C30 H	83, 191	-
* C29 Alkycyclohex. / C30 H	83, 191	-
* C23-C29 Tricyclics / C30 H	191	331.26
* (C30 H + C30 M) / (C29(NS's + IS's + DS's))	191, 217	34.15

----- STERANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
* C27 ST's / (C27 + C28 + C29) ST's	217	-
* C28 ST's / (C27 + C28 + C29) ST's	217	-
* C29 ST's / (C27 + C28 + C29) ST's	217	-
* C27S NS / (C27S NS + C27R NS)	217	-
* C28S NS / (C28S NS + C28R NS)	217	29.89
* C29S NS / (C29S NS + C29R NS)	217	52.63
* C27 NS's / C29 NS's	217	-
* C27 IS's / C29 IS's	217	-
* C27 DS's / C29 DS's	217	-
* C27 DS's / C27 ST's	217	-
* C28 DS's / C28 ST's	217	-
* C29 DS's / C29 ST's	217	41.32
* C27 IS's / (C27 IS's + C27 NS's)	217	-
* C28 IS's / (C28 IS's + C28 NS's)	217	-
* C29 IS's / (C29 IS's + C29 NS's)	217	60.04

NOTES : H = Hopane M = Moretane Me = Methyl NS = Normal Sterane
 IS = Iso Sterane DS = Dia Sterane ST = NS + IS + DS U = Unknown
 - = no data available

TABLE 13-1

WELL - LA BELLA-1		SATURATE FRACTION SIR GC/MS DATA - OILS		DEPTH UNIT - Metres	
COUNTRY - Australia		DETAILED COMPOUND ANALYSIS		DATE OF JOB - Oct 93	
BASIN - Otway		DEPTH 1 - 2160.50	DEPTH 2 - 2160.50		
COMPOUND	ION	RELATIVE AMOUNT	COMPOUND	ION	RELATIVE AMOUNT
C23 Tricyclic	191	872.0	C24 Tricyclic	191	541.0
C25 Tricyclic	191	329.0	C26 Tricyclic	191	5698.0
C28 Tricyclic	191	604.0	C29 Tricyclic	191	495.0
C24 Tetracyclic	191	373.0			
C27 Hopane (Ts)	191	479.0	C27 Hopane (Tm)	191	684.0
C27 Hopane (17B)	191	-			
C28 Hopane (25,30)	191	-	C28 Hopane (28,30)	191	-
C29 Hopane	191	1738.0	C29 Moretane	191	190.0
C29 Demeth. Hopane	191	-	C29 Hopane (BB)	191	-
C30 Hopane	191	2184.0	C30 Moretane	191	308.0
C30 Hopane (BB)	191	-			
C31S Hopane	191	877.0	C31R Hopane	191	648.0
C31S+R Hopane (BB)	191	-	C31S+R Moretane	191	-
C32S Hopane	191	470.0	C32R Hopane	191	319.0
C32S+R Hopane (BB)	191	-	C32S+R Moretane	191	-
C33S Hopane	191	-	C33R Hopane	191	-
Gammacerane	191	-	Oleanane (18a)	191	-
Unknown 1	191	-	Unknown 2	191	169.0
Unknown 3	191	374.0	Unknown 4	191	301.0
C27 Demeth. Hopane	177	-	C28 Demeth. Hopane	177	-
C29 Hopane	177	-	C29 Demeth. Hopane	177	-
C29 Moretane	177	-	C29 Hopane (BB)	177	-
Unknown 3	177	-			
C30 2-Methylhopane	205	-	C31 2-Methylhopane	205	-
C31S Hopane	205	-	C31R Hopane	205	-
C31S+R Moretane	205	-	C31S+R Hopane (BB)	205	-
C21 Sterane	217	-	C22 Sterane	217	-
C27S Normal Sterane	217	-	C27R Normal Sterane	217	418.0
C27S Isosterane	217	-	C27R Isosterane	217	-
C27S Diasterane	217	-	C27R Diasterane	217	-
C28S Normal Sterane	217	107.0	C28R Normal Sterane	217	201.0
C28S Isosterane	217	-	C28R Isosterane	217	-
C28S Diasterane	217	-	C28R Diasterane	217	-
C29S Normal Sterane	217	559.0	C29R Normal Sterane	217	527.0
C29S Isosterane	217	753.0	C29R Isosterane	217	737.0
C29S Diasterane	217	886.0	C29R Diasterane	217	550.0
C27S+R Isosterane	218	1323.0	C28S+R Isosterane	218	926.0
C29S+R Isosterane	218	2438.0			
C27S Diasterane	259	350.0	C27R Diasterane	259	202.0
C28S Diasterane	259	255.0	C28R Diasterane	259	219.0
C29S Diasterane	259	417.0	C29R Diasterane	259	263.0
16a Phyllocladane	123	-	16B Phyllocladane	123	1860.0
Beyerene	123	1099.0	Labdane	123	-
Fichtelite	123	-	Rimuane	123	-
Nortetracyclane	123	994.0	Pimerane	123	-
Isopimerane	123	-	Kaurane	123	-
Norisopimerane	123	1357.0	Unknown 1	123	-
Drimane	123	14592.0	Homodrimane	123	26253.0
Rearranged Drimane 1	123	18008.0	Rearranged Drimane 2	123	10134.0
Eudesmane	123	-			
C15 Alkylcyclohexane	83	-	C17 Alkylcyclohexane	83	-
C21 Alkylcyclohexane	83	-	C22 Alkylcyclohexane	83	-
C25 Alkylcyclohexane	83	-	C29 Alkylcyclohexane	83	-

- = no data IUPAC names corresponding to common names used here are shown at the end of the tables

TABLE 13-2

SATURATE FRACTION SIR GC/MS DATA - OILS

CALCULATED DATA

DESCRIPTION : RFT SAMPLE

WELL = LA BELLA-1 DEPTH 1(m) = 2160.50 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2(m) = 2160.50 DATE OF JOB = Oct 93
 BASIN = Otway

----- TERPANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% Ts / (Ts + Tm)	191	41.19
% C29 M / (C29 H + C29 M)	191	9.85
% C30 M / (C30 H + C30 M)	191	12.36
% C31S H / (C31S H + C31R H)	191	57.51
% C31S H / (C31S H + C31R H)	205	-
% C32S H / (C32S H + C32R H)	191	59.57
% U1-U4 / (U1-U4 + C30 H)	191	-
% U1 / (U1 + C30 H)	191	-
% U2 / (U2 + C30 H)	191	7.18
% U3 / (U3 + C30 H)	191	14.62
% U4 / (U4 + C30 H)	191	12.11
% C29 H / (C29 H + C30 H)	191	44.31
% C31 2-MeH / (C31 2-MeH + C30 H)	191, 205	-
% C29 BB / (C29 BB + C 29H + C29 M)	191	-
% C29 DeMe / (C29 DeMe + C29H)	177	-
% C28 H's / (C28 H's + C30 H)	191	-
% (Ts + Tm + C28 H's) / C29(H + M) + C30(H + M)	191	-
% Oleanane (18a) / (Oleanane + C30H)	191	-
% Drimane / Homodrimane	123	55.58
% Res. Drimanes / (Drimane + Homodrimane)	123	68.90
% C22 Alkycyclohex. / C30 H	83, 191	-
% C29 Alkycyclohex. / C30 H	83, 191	-
% C23-C29 Tricyclics / C30 H	191	390.98
% (C30 H + C30 M) / (C29(NS's + IS's + DS's)	191, 217	62.11

----- STERANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% C27 ST's / (C27 + C28 + C29) ST's	217	-
% C28 ST's / (C27 + C28 + C29) ST's	217	-
% C29 ST's / (C27 + C28 + C29) ST's	217	-
% C27S NS / (C27S NS + C27R NS)	217	-
% C28S NS / (C28S NS + C28R NS)	217	34.74
% C29S NS / (C29S NS + C29R NS)	217	51.47
% C27 NS's / C29 NS's	217	-
% C27 IS's / C29 IS's	217	-
% C27 DS's / C29 DS's	217	-
% C27 DS's / C27 ST's	217	-
% C28 DS's / C28 ST's	217	-
% C29 DS's / C29 ST's	217	35.79
% C27 IS's / (C27 IS's + C27 NS's)	217	-
% C28 IS's / (C28 IS's + C28 NS's)	217	-
% C29 IS's / (C29 IS's + C29 NS's)	217	57.84

NOTES : H = Hopane M = Moretane Me = Methyl NS = Normal Sterane
 IS = Iso Sterane DS = Dia Sterane ST = NS + IS + DS U = Unknown
 - = no data available

TABLE 14-1

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS			DETAILED COMPOUND ANALYSIS		
WELL = LA BELLA-1					
COUNTRY = Australia					DEPTH UNIT = Metres
BASIN = Otway					DATE OF JOB = Oct 93
		DEPTH 1 = 2070.00		DEPTH 2 = 2070.00	
COMPOUND	ION	RELATIVE AMOUNT	COMPOUND	ION	RELATIVE AMOUNT
C23 Tricyclic	191	1225.0	C24 Tricyclic	191	788.0
C25 Tricyclic	191	-	C26 Tricyclic	191	-
C28 Tricyclic	191	-	C29 Tricyclic	191	-
C24 Tetracyclic	191	2854.0			
C27 Hopane (Ts)	191	1545.0	C27 Hopane (Tm)	191	17000.0
C27 Hopane (17B)	191	1871.0			
C28 Hopane (25,30)	191	-	C28 Hopane (28,30)	191	9187.0
C29 Hopane	191	20220.0	C29 Moretane	191	5353.0
C29 Demeth. Hopane	191	-	C29 Hopane (BB)	191	1118.0
C30 Hopane	191	25141.0	C30 Moretane	191	8218.0
C30 Hopane (BB)	191	1315.0			
C31S Hopane	191	12576.0	C31R Hopane	191	9608.0
C31S+R Hopane (BB)	191	-	C31S+R Moretane	191	3591.0
C32S Hopane	191	4974.0	C32R Hopane	191	4004.0
C32S+R Hopane (BB)	191	-	C32S+R Moretane	191	2048.0
C33S Hopane	191	-	C33R Hopane	191	-
Gammacerane	191	-	Oleanane (18a)	191	-
Unknown 1	191	-	Unknown 2	191	-
Unknown 3	191	2121.0	Unknown 4	191	1413.0
C27 Demeth. Hopane	177	-	C28 Demeth. Hopane	177	-
C29 Hopane	177	-	C29 Demeth. Hopane	177	-
C29 Moretane	177	-	C29 Hopane (BB)	177	-
Unknown 3	177	-			
C30 2-Methylhopane	205	-	C31 2-Methylhopane	205	-
C31S Hopane	205	-	C31R Hopane	205	-
C31S+R Moretane	205	-	C31S+R Hopane (BB)	205	-
C21 Sterane	217	-	C22 Sterane	217	-
C27S Normal Sterane	217	668.0	C27R Normal Sterane	217	1424.0
C27S Isoesterane	217	-	C27R Isoesterane	217	-
C27S Diasterane	217	-	C27R Diasterane	217	-
C28S Normal Sterane	217	132.0	C28R Normal Sterane	217	784.0
C28S Isoesterane	217	-	C28R Isoesterane	217	-
C28S Diasterane	217	-	C28R Diasterane	217	-
C29S Normal Sterane	217	1094.0	C29R Normal Sterane	217	2985.0
C29S Isoesterane	217	1107.0	C29R Isoesterane	217	1276.0
C29S Diasterane	217	1420.0	C29R Diasterane	217	887.0
C27S+R Isoesterane	218	1059.0	C28S+R Isoesterane	218	1101.0
C29S+R Isoesterane	218	2927.0			
C27S Diasterane	259	374.0	C27R Diasterane	259	286.0
C28S Diasterane	259	477.0	C28R Diasterane	259	344.0
C29S Diasterane	259	660.0	C29R Diasterane	259	445.0
16a Phyllocladane	123	-	16B Phyllocladane	123	3482.0
Beyerene	123	2062.0	Labdane	123	-
Fichtelite	123	-	Rimuanene	123	-
Nortetracyclane	123	2923.0	Pimerane	123	-
Isopimerane	123	-	Kaurane	123	1617.0
Norisopimerane	123	3323.0	Unknown 1	123	-
Drimane	123	4908.0	Homodrimane	123	12849.0
Rearranged Drimane 1	123	4892.0	Rearranged Drimane 2	123	2730.0
Eudesmane	123	-			
C15 Alkylcyclohexane	83	-	C17 Alkylcyclohexane	83	-
C21 Alkylcyclohexane	83	-	C22 Alkylcyclohexane	83	-
C25 Alkylcyclohexane	83	-	C29 Alkylcyclohexane	83	-

- = no data IUPAC names corresponding to common names used here are shown at the end of the tables

TABLE 14-2

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS

CALCULATED DATA

WELL = LA BELLA-1 DEPTH 1(m) = 2070.00 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2(m) = 2070.00 DATE OF JOB = Oct 93
 BASIN = Otway

----- TERPANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% Ts / (Ts + Tm)	191	8.33
% C29 M / (C29 H + C29 M)	191	20.93
% C30 M / (C30 H + C30 M)	191	24.64
% C31S H / (C31S H + C31R H)	191	56.69
% C31S H / (C31S H + C31R H)	205	-
% C32S H / (C32S H + C32R H)	191	55.40
% U1-U4 / (U1-U4 + C30 H)	191	-
% U1 / (U1 + C30 H)	191	-
% U2 / (U2 + C30 H)	191	-
% U3 / (U3 + C30 H)	191	7.78
% U4 / (U4 + C30 H)	191	5.32
% C29 H / (C29 H + C30 H)	191	44.58
% C31 2-MeH / (C31 2-MeH + C30 H)	191, 205	-
% C29 BB / (C29 BB + C 29H + C29 M)	191	4.19
% C29 DeMe / (C29 DeMe + C29H)	177	-
% C28 H's / (C28 H's + C30 H)	191	-
% (Ts + Tm + C28 H's) / C29(H + M) + C30(H + M)	191	-
% Oleanane (18a) / (Oleanane + C30H)	191	-
% Drimane / Homodrimane	123	38.20
% Rea. Drimanes / (Drimane + Homodrimane)	123	42.92
% C22 Alkylcyclohex. / C30 H	83, 191	-
% C29 Alkylcyclohex. / C30 H	83, 191	-
% C23-C29 Tricyclics / C30 H	191	-
% (C30 H + C30 M) / (C29(NS's + IS's + DS's))	191, 217	380.42

----- STERANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% C27 ST's / (C27 + C28 + C29) ST's	217	-
% C28 ST's / (C27 + C28 + C29) ST's	217	-
% C29 ST's / (C27 + C28 + C29) ST's	217	-
% C27S NS / (C27S NS + C27R NS)	217	31.93
% C28S NS / (C28S NS + C28R NS)	217	14.41
% C29S NS / (C29S NS + C29R NS)	217	26.82
% C27 NS's / C29 NS's	217	51.29
% C27 IS's / C29 IS's	217	-
% C27 DS's / C29 DS's	217	-
% C27 DS's / C27 ST's	217	-
% C28 DS's / C28 ST's	217	-
% C29 DS's / C29 ST's	217	26.31
% C27 IS's / (C27 IS's + C27 NS's)	217	-
% C28 IS's / (C28 IS's + C28 NS's)	217	-
% C29 IS's / (C29 IS's + C29 NS's)	217	36.88

NOTES : H = Hopane M = Moretane Me = Methyl NS = Normal Sterane
 IS = Iso Sterane DS = Dia Sterane ST = NS + IS + DS U = Unknown
 - = no data available

TABLE 15-1

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS			DETAILED COMPOUND ANALYSIS		
WELL - LA BELLA-1					
COUNTRY - Australia					DEPTH UNIT = Metres
BASIN - Otway					DATE OF JOB = Oct 93
		DEPTH 1 = 2097.70		DEPTH 2 = 2097.70	
COMPOUND	ION	RELATIVE AMOUNT	COMPOUND	ION	RELATIVE AMOUNT
C23 Tricyclic	191	4129.0	C24 Tricyclic	191	3441.0
C25 Tricyclic	191	-	C26 Tricyclic	191	-
C28 Tricyclic	191	-	C29 Tricyclic	191	-
C24 Tetracyclic	191	23829.0			
C27 Hopane (Ts)	191	5432.0	C27 Hopane (Tm)	191	97739.0
C27 Hopane (17B)	191	-			
C28 Hopane (25,30)	191	10292.0	C28 Hopane (28,30)	191	60394.0
C29 Hopane	191	106276.0	C29 Moretane	191	30551.0
C29 Demeth. Hopane	191	-	C29 Hopane (BB)	191	4249.0
C30 Hopane	191	212896.0	C30 Moretane	191	40210.0
C30 Hopane (BB)	191	3710.0			
C31S Hopane	191	53915.0	C31R Hopane	191	38899.0
C31S+R Hopane (BB)	191	-	C31S+R Moretane	191	16678.0
C32S Hopane	191	14831.0	C32R Hopane	191	12292.0
C32S+R Hopane (BB)	191	-	C32S+R Moretane	191	7596.0
C33S Hopane	191	-	C33R Hopane	191	-
Gammacerane	191	-	Oleanane (18a)	191	-
Unknown 1	191	-	Unknown 2	191	-
Unknown 3	191	6217.0	Unknown 4	191	7235.0
C27 Demeth. Hopane	177	-	C28 Demeth. Hopane	177	-
C29 Hopane	177	-	C29 Demeth. Hopane	177	-
C29 Moretane	177	-	C29 Hopane (BB)	177	-
Unknown 3	177	-			
C30 2-Methylhopane	205	-	C31 2-Methylhopane	205	-
C31S Hopane	205	-	C31R Hopane	205	-
C31S+R Moretane	205	-	C31S+R Hopane (BB)	205	-
C21 Sterane	217	-	C22 Sterane	217	-
C27S Normal Sterane	217	3882.0	C27R Normal Sterane	217	8136.0
C27S Isosterane	217	-	C27R Isosterane	217	-
C27S Diasterane	217	-	C27R Diasterane	217	-
C28S Normal Sterane	217	1403.0	C28R Normal Sterane	217	6043.0
C28S Isosterane	217	-	C28R Isosterane	217	-
C28S Diasterane	217	-	C28R Diasterane	217	-
C29S Normal Sterane	217	9118.0	C29R Normal Sterane	217	22714.0
C29S Isosterane	217	9383.0	C29R Isosterane	217	10811.0
C29S Diasterane	217	12370.0	C29R Diasterane	217	7715.0
C27S+R Isosterane	218	3552.0	C28S+R Isosterane	218	7523.0
C29S+R Isosterane	218	21162.0			
C27S Diasterane	259	2191.0	C27R Diasterane	259	1448.0
C28S Diasterane	259	3034.0	C28R Diasterane	259	2679.0
C29S Diasterane	259	8457.0	C29R Diasterane	259	5293.0
16a Phyllocladane	123	-	16B Phyllocladane	123	28328.0
Beyerene	123	11362.0	Labdane	123	-
Fichtelite	123	-	Rimuanane	123	-
Nortetracyclane	123	17431.0	Pimerane	123	-
Isopimerane	123	-	Kaurane	123	10422.0
Norisopimerane	123	-	Unknown 1	123	-
Drimane	123	27275.0	Homodrimane	123	69435.0
Rearranged Drimane 1	123	19361.0	Rearranged Drimane 2	123	9839.0
Eudesmane	123	-			
C15 Alkylcyclohexane	83	-	C17 Alkylcyclohexane	83	-
C21 Alkylcyclohexane	83	-	C22 Alkylcyclohexane	83	-
C25 Alkylcyclohexane	83	-	C29 Alkylcyclohexane	83	-

- = no data IUPAC names corresponding to common names used here are shown at the end of the tables

TABLE 15-2

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS

CALCULATED DATA

WELL = LA BELLA-1 DEPTH 1(m) = 2097.70 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2(m) = 2097.70 DATE OF JOB = Oct 93
 BASIN = Otway

----- TERPANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
* Ts / (Ts + Tm)	191	5.27
* C29 M / (C29 H + C29 M)	191	22.33
* C30 M / (C30 H + C30 M)	191	15.89
* C31S H / (C31S H + C31R H)	191	58.09
* C31S H / (C31S H + C31R H)	205	-
* C32S H / (C32S H + C32R H)	191	54.68
* U1-U4 / (U1-U4 + C30 H)	191	-
* U1 / (U1 + C30 H)	191	-
* U2 / (U2 + C30 H)	191	-
* U3 / (U3 + C30 H)	191	2.84
* U4 / (U4 + C30 H)	191	3.29
* C29 H / (C29 H + C30 H)	191	33.30
* C31 2-MeH / (C31 2-MeH + C30 H)	191, 205	-
* C29 BB / (C29 BB + C 29H + C29 M)	191	3.01
* C29 DeMe / (C29 DeMe + C29H)	177	-
* C28 H's / (C28 H's + C30 H)	191	24.93
* (Ts + Tm + C28 H's) / C29(H + M) + C30(H + M)	191	44.59
* Oleanane (18a) / (Oleanane + C30H)	191	-
* Drimane / Homodrimane	123	39.28
* Rea. Drimanes / (Drimane + Homodrimane)	123	30.19
* C22 Alkycyclohex. / C30 H	83, 191	-
* C29 Alkycyclohex. / C30 H	83, 191	-
* C23-C29 Tricyclics / C30 H	191	-
* (C30 H + C30 M) / (C29(NS's + IS's + DS's)	191, 217	350.99

----- STERANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
* C27 ST's / (C27 + C28 + C29) ST's	217	-
* C28 ST's / (C27 + C28 + C29) ST's	217	-
* C29 ST's / (C27 + C28 + C29) ST's	217	-
* C27S NS / (C27S NS + C27R NS)	217	32.30
* C28S NS / (C28S NS + C28R NS)	217	18.84
* C29S NS / (C29S NS + C29R NS)	217	28.64
* C27 NS's / C29 NS's	217	37.75
* C27 IS's / C29 IS's	217	-
* C27 DS's / C29 DS's	217	-
* C27 DS's / C27 ST's	217	-
* C28 DS's / C28 ST's	217	-
* C29 DS's / C29 ST's	217	27.85
* C27 IS's / (C27 IS's + C27 NS's)	217	-
* C28 IS's / (C28 IS's + C28 NS's)	217	-
* C29 IS's / (C29 IS's + C29 NS's)	217	38.82

NOTES : H = Hopane M = Moretane Me = Methyl NS = Normal Sterane
 IS = Iso Sterane DS = Dia Sterane ST = NS + IS + DS U = Unknown
 - = no data available

TABLE 16-1

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS			DETAILED COMPOUND ANALYSIS		
WELL - LA BELLA-1					
COUNTRY - Australia					DEPTH UNIT - Metres
BASIN - Otway					DATE OF JOB - Oct 93
		DEPTH 1 = 2100.00		DEPTH 2 = 2110.00	
COMPOUND	ION	RELATIVE AMOUNT	COMPOUND	ION	RELATIVE AMOUNT
C23 Tricyclic	191	6907.0	C24 Tricyclic	191	4137.0
C25 Tricyclic	191	3003.0	C26 Tricyclic	191	39197.0
C28 Tricyclic	191	7757.0	C29 Tricyclic	191	6800.0
C24 Tetracyclic	191	7996.0			
C27 Hopane (Ts)	191	12288.0	C27 Hopane (Tm)	191	23783.0
C27 Hopane (17B)	191	-			
C28 Hopane (25,30)	191	4117.0	C28 Hopane (28,30)	191	8372.0
C29 Hopane	191	39526.0	C29 Moretane	191	10634.0
C29 Demeth. Hopane	191	9274.0	C29 Hopane (BB)	191	3448.0
C30 Hopane	191	52839.0	C30 Moretane	191	11603.0
C30 Hopane (BB)	191	3999.0			
C31S Hopane	191	19836.0	C31R Hopane	191	16027.0
C31S+R Hopane (BB)	191	-	C31S+R Moretane	191	4484.0
C32S Hopane	191	9758.0	C32R Hopane	191	7717.0
C32S+R Hopane (BB)	191	-	C32S+R Moretane	191	-
C33S Hopane	191	-	C33R Hopane	191	-
Gammacerane	191	-	Oleanane (18a)	191	-
Unknown 1	191	-	Unknown 2	191	-
Unknown 3	191	9956.0	Unknown 4	191	3967.0
C27 Demeth. Hopane	177	-	C28 Demeth. Hopane	177	-
C29 Hopane	177	-	C29 Demeth. Hopane	177	-
C29 Moretane	177	-	C29 Hopane (BB)	177	-
Unknown 3	177	-			
C30 2-Methylhopane	205	-	C31 2-Methylhopane	205	-
C31S Hopane	205	-	C31R Hopane	205	-
C31S+R Moretane	205	-	C31S+R Hopane (BB)	205	-
C21 Sterane	217	-	C22 Sterane	217	-
C27S Normal Sterane	217	-	C27R Normal Sterane	217	5150.0
C27S Isoesterane	217	-	C27R Isoesterane	217	-
C27S Diasterane	217	-	C27R Diasterane	217	-
C28S Normal Sterane	217	1185.0	C28R Normal Sterane	217	3217.0
C28S Isoesterane	217	-	C28R Isoesterane	217	-
C28S Diasterane	217	-	C28R Diasterane	217	-
C29S Normal Sterane	217	4043.0	C29R Normal Sterane	217	6468.0
C29S Isoesterane	217	5528.0	C29R Isoesterane	217	5303.0
C29S Diasterane	217	6004.0	C29R Diasterane	217	4796.0
C27S+R Isoesterane	218	11559.0	C28S+R Isoesterane	218	10116.0
C29S+R Isoesterane	218	15060.0			
C27S Diasterane	259	4067.0	C27R Diasterane	259	2587.0
C28S Diasterane	259	4102.0	C28R Diasterane	259	2814.0
C29S Diasterane	259	3516.0	C29R Diasterane	259	2474.0
16a Phyllocladane	123	-	16B Phyllocladane	123	7075.0
Beyerene	123	2815.0	Labdane	123	-
Fichtelite	123	-	Rimuanene	123	-
Nortetracyclane	123	4104.0	Pimerane	123	-
Isopimerane	123	-	Kaurane	123	-
Norisopimerane	123	-	Unknown 1	123	-
Drimane	123	6384.0	Homodrimane	123	17699.0
Rearranged Drimane 1	123	4154.0	Rearranged Drimane 2	123	2615.0
Eudesmane	123	-			
C15 Alkylcyclohexane	83	-	C17 Alkylcyclohexane	83	-
C21 Alkylcyclohexane	83	-	C22 Alkylcyclohexane	83	-
C25 Alkylcyclohexane	83	-	C29 Alkylcyclohexane	83	-

- = no data IUPAC names corresponding to common names used here are shown at the end of the tables

TABLE 16-2

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS

CALCULATED DATA

WELL = LA BELLA-1 DEPTH 1(m) = 2100.00 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2(m) = 2110.00 DATE OF JOB = Oct 93
 BASIN = Otway

----- TERPANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% Ts / (Ts + Tm)	191	34.07
% C29 M / (C29 H + C29 M)	191	21.20
% C30 M / (C30 H + C30 M)	191	18.01
% C31S H / (C31S H + C31R H)	191	55.31
% C31S H / (C31S H + C31R H)	205	-
% C32S H / (C32S H + C32R H)	191	55.84
% U1-U4 / (U1-U4 + C30 H)	191	-
% U1 / (U1 + C30 H)	191	-
% U2 / (U2 + C30 H)	191	-
% U3 / (U3 + C30 H)	191	15.85
% U4 / (U4 + C30 H)	191	6.98
% C29 H / (C29 H + C30 H)	191	42.79
% C31 2-MeH / (C31 2-MeH + C30 H)	191, 205	-
% C29 BB / (C29 BB + C 29H + C29 M)	191	6.43
% C29 DeMe / (C29 DeMe + C29H)	177	-
% C28 H's / (C28 H's + C30 H)	191	19.12
% (Ts + Tm + C28 H's) / C29(H + M) + C30(H + M)	191	42.37
% Oleanane (18a) / (Oleanane + C30H)	191	-
% Drimane / Homodrimane	123	36.07
% Rea. Drimanes / (Drimane + Homodrimane)	123	28.11
% C22 Alkycyclohex. / C30 H	83, 191	-
% C29 Alkycyclohex. / C30 H	83, 191	-
% C23-C29 Tricyclics / C30 H	191	128.32
% (C30 H + C30 M) / (C29(NS's + IS's + DS's))	191, 217	200.49

----- STERANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% C27 ST's / (C27 + C28 + C29) ST's	217	-
% C28 ST's / (C27 + C28 + C29) ST's	217	-
% C29 ST's / (C27 + C28 + C29) ST's	217	-
% C27S NS / (C27S NS + C27R NS)	217	-
% C28S NS / (C28S NS + C28R NS)	217	26.92
% C29S NS / (C29S NS + C29R NS)	217	38.46
% C27 NS's / C29 NS's	217	-
% C27 IS's / C29 IS's	217	-
% C27 DS's / C29 DS's	217	-
% C27 DS's / C27 ST's	217	-
% C28 DS's / C28 ST's	217	-
% C29 DS's / C29 ST's	217	33.60
% C27 IS's / (C27 IS's + C27 NS's)	217	-
% C28 IS's / (C28 IS's + C28 NS's)	217	-
% C29 IS's / (C29 IS's + C29 NS's)	217	50.75

NOTES : H = Hopane M = Moretane Me = Methyl NS = Normal Sterane
 IS = Iso Sterane DS = Dia Sterane ST = NS + IS + DS U = Unknown
 - = no data available

TABLE 17-1

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS			DETAILED COMPOUND ANALYSIS		
WELL - LA BELLA-1					
COUNTRY - Australia					DEPTH UNIT = Metres
BASIN - Otway					DATE OF JOB = Oct 93
		DEPTH 1 = 2121.00		DEPTH 2 = 2121.00	
COMPOUND	ION	RELATIVE AMOUNT	COMPOUND	ION	RELATIVE AMOUNT
C23 Tricyclic	191	1807.0	C24 Tricyclic	191	1037.0
C25 Tricyclic	191	3857.0	C26 Tricyclic	191	-
C28 Tricyclic	191	-	C29 Tricyclic	191	-
C24 Tetracyclic	191	2319.0			
C27 Hopane (Ts)	191	1712.0	C27 Hopane (Tm)	191	8361.0
C27 Hopane (17B)	191	-			
C28 Hopane (25,30)	191	1048.0	C28 Hopane (28,30)	191	4492.0
C29 Hopane	191	12019.0	C29 Moretane	191	2895.0
C29 Demeth. Hopane	191	-	C29 Hopane (BB)	191	697.0
C30 Hopane	191	14411.0	C30 Moretane	191	4011.0
C30 Hopane (BB)	191	744.0			
C31S Hopane	191	6998.0	C31R Hopane	191	5210.0
C31S+R Hopane (BB)	191	-	C31S+R Moretane	191	1631.0
C32S Hopane	191	2986.0	C32R Hopane	191	2184.0
C32S+R Hopane (BB)	191	-	C32S+R Moretane	191	927.0
C33S Hopane	191	-	C33R Hopane	191	-
Gammacerane	191	-	Oleanane (18a)	191	-
Unknown 1	191	-	Unknown 2	191	-
Unknown 3	191	1773.0	Unknown 4	191	855.0
C27 Demeth. Hopane	177	-	C28 Demeth. Hopane	177	-
C29 Hopane	177	-	C29 Demeth. Hopane	177	-
C29 Moretane	177	-	C29 Hopane (BB)	177	-
Unknown 3	177	-			
C30 2-Methylhopane	205	-	C31 2-Methylhopane	205	-
C31S Hopane	205	-	C31R Hopane	205	-
C31S+R Moretane	205	-	C31S+R Hopane (BB)	205	-
C21 Sterane	217	-	C22 Sterane	217	-
C27S Normal Sterane	217	1149.0	C27R Normal Sterane	217	2476.0
C27S Isosterane	217	-	C27R Isosterane	217	-
C27S Diasterane	217	-	C27R Diasterane	217	-
C28S Normal Sterane	217	288.0	C28R Normal Sterane	217	671.0
C28S Isosterane	217	-	C28R Isosterane	217	-
C28S Diasterane	217	-	C28R Diasterane	217	-
C29S Normal Sterane	217	1117.0	C29R Normal Sterane	217	2216.0
C29S Isosterane	217	1101.0	C29R Isosterane	217	1111.0
C29S Diasterane	217	1149.0	C29R Diasterane	217	702.0
C27S+R Isosterane	218	1606.0	C28S+R Isosterane	218	1531.0
C29S+R Isosterane	218	2787.0			
C27S Diasterane	259	500.0	C27R Diasterane	259	302.0
C28S Diasterane	259	602.0	C28R Diasterane	259	376.0
C29S Diasterane	259	576.0	C29R Diasterane	259	385.0
16a Phyllocladane	123	-	16B Phyllocladane	123	2368.0
Beyerene	123	1941.0	Labdane	123	-
Fichtelite	123	-	Rimuanane	123	-
Nortetracyclane	123	1989.0	Pimerane	123	-
Isopimerane	123	-	Kaurane	123	-
Norisopimerane	123	-	Unknown 1	123	-
Drimane	123	10405.0	Homodrimane	123	28997.0
Rearranged Drimane 1	123	11043.0	Rearranged Drimane 2	123	6958.0
Eudesmane	123	-			
C15 Alkylcyclohexane	83	-	C17 Alkylcyclohexane	83	-
C21 Alkylcyclohexane	83	-	C22 Alkylcyclohexane	83	-
C25 Alkylcyclohexane	83	-	C29 Alkylcyclohexane	83	-

- = no data IUPAC names corresponding to common names used here are shown at the end of the tables

TABLE 17-2

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS

CALCULATED DATA

WELL = LA BELLA-1 DEPTH 1(m) = 2121.00 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2(m) = 2121.00 DATE OF JOB = Oct 93
 BASIN = Otway

----- TERPANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% Ts / (Ts + Tm)	191	17.00
% C29 M / (C29 H + C29 M)	191	19.41
% C30 M / (C30 H + C30 M)	191	21.77
% C31S H / (C31S H + C31R H)	191	57.32
% C31S H / (C31S H + C31R H)	205	-
% C32S H / (C32S H + C32R H)	191	57.76
% U1-U4 / (U1-U4 + C30 H)	191	-
% U1 / (U1 + C30 H)	191	-
% U2 / (U2 + C30 H)	191	-
% U3 / (U3 + C30 H)	191	10.96
% U4 / (U4 + C30 H)	191	5.60
% C29 H / (C29 H + C30 H)	191	45.47
% C31 2-MeH / (C31 2-MeH + C30 H)	191, 205	-
% C29 BB / (C29 BB + C 29H + C29 M)	191	4.46
% C29 DeMe / (C29 DeMe + C29H)	177	-
% C28 H's / (C28 H's + C30 H)	191	27.77
% (Ts + Tm + C28 H's) / C29(H + M) + C30(H + M)	191	46.84
% Oleanane (18a) / (Oleanane + C30H)	191	-
% Drimane / Homodrimane	123	35.88
% Rea. Drimanes / (Drimane + Homodrimane)	123	45.69
% C22 Alkycyclohex. / C30 H	83, 191	-
% C29 Alkycyclohex. / C30 H	83, 191	-
% C23-C29 Tricyclics / C30 H	191	-
% (C30 H + C30 M) / (C29(NS's + IS's + DS's))	191, 217	249.08

----- STERANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% C27 ST's / (C27 + C28 + C29) ST's	217	-
% C28 ST's / (C27 + C28 + C29) ST's	217	-
% C29 ST's / (C27 + C28 + C29) ST's	217	-
% C27S NS / (C27S NS + C27R NS)	217	31.70
% C28S NS / (C28S NS + C28R NS)	217	30.03
% C29S NS / (C29S NS + C29R NS)	217	33.51
% C27 NS's / C29 NS's	217	108.76
% C27 IS's / C29 IS's	217	-
% C27 DS's / C29 DS's	217	-
% C27 DS's / C27 ST's	217	-
% C28 DS's / C28 ST's	217	-
% C29 DS's / C29 ST's	217	25.03
% C27 IS's / (C27 IS's + C27 NS's)	217	-
% C28 IS's / (C28 IS's + C28 NS's)	217	-
% C29 IS's / (C29 IS's + C29 NS's)	217	39.89

NOTES : H = Hopane M = Moretane Me = Methyl NS = Normal Sterane
 IS = Iso Sterane DS = Dia Sterane ST = NS + IS + DS U = Unknown
 - = no data available

TABLE 18-1

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS			DEPTH UNIT - Metres		
WELL - LA BELLA-1			DATE OF JOB - Oct 93		
COUNTRY - Australia			DEPTH 1 - 2159.00		
BASIN - Otway			DEPTH 2 - 2159.00		
COMPOUND	ION	RELATIVE AMOUNT	COMPOUND	ION	RELATIVE AMOUNT
C23 Tricyclic	191	3610.0	C24 Tricyclic	191	1628.0
C25 Tricyclic	191	-	C26 Tricyclic	191	-
C28 Tricyclic	191	-	C29 Tricyclic	191	-
C24 Tetracyclic	191	5313.0	C27 Hopane (Tm)	191	27697.0
C27 Hopane (Ts)	191	4224.0	C28 Hopane (28,30)	191	16309.0
C27 Hopane (17B)	191	-	C29 Moretane	191	7406.0
C28 Hopane (25,30)	191	2324.0	C29 Hopane (BB)	191	1770.0
C29 Hopane	191	33200.0	C30 Moretane	191	10221.0
C29 Demeth. Hopane	191	-	C31R Hopane	191	11850.0
C30 Hopane	191	37631.0	C31S+R Moretane	191	3773.0
C30 Hopane (BB)	191	1606.0	C32R Hopane	191	4842.0
C31S Hopane	191	16332.0	C32S+R Moretane	191	2226.0
C31S+R Hopane (BB)	191	-	C33R Hopane	191	-
C32S Hopane	191	6637.0	Oleanane (18a)	191	-
C32S+R Hopane (BB)	191	-	Unknown 2	191	-
C33S Hopane	191	-	Unknown 4	191	2368.0
Gammacerane	191	-	C28 Demeth. Hopane	177	-
Unknown 1	191	-	C29 Demeth. Hopane	177	-
Unknown 3	191	3860.0	C29 Hopane (BB)	177	-
C27 Demeth. Hopane	177	-	C31 2-Methylhopane	205	-
C29 Hopane	177	-	C31R Hopane	205	-
C29 Moretane	177	-	C31S+R Hopane (BB)	205	-
Unknown 3	177	-	C22 Sterane	217	-
C30 2-Methylhopane	205	-	C27R Normal Sterane	217	2280.0
C31S Hopane	205	-	C27R Isosterane	217	-
C31S+R Moretane	205	-	C27R Diasterane	217	-
C21 Sterane	217	-	C28R Normal Sterane	217	1778.0
C27S Normal Sterane	217	1729.0	C28R Isosterane	217	-
C27S Isosterane	217	-	C28R Diasterane	217	-
C27S Diasterane	217	-	C29R Normal Sterane	217	5740.0
C28S Normal Sterane	217	589.0	C29R Isosterane	217	3122.0
C28S Isosterane	217	-	C29R Diasterane	217	1654.0
C28S Diasterane	217	-	C28S+R Isosterane	218	3147.0
C29S Normal Sterane	217	3181.0	C27R Diasterane	259	754.0
C29S Isosterane	217	2828.0	C28R Diasterane	259	980.0
C29S Diasterane	217	2504.0	C29R Diasterane	259	1069.0
C27S+R Isosterane	218	3826.0	16B Phyllocladane	123	4837.0
C29S+R Isosterane	218	7063.0	Labdane	123	-
C27S Diasterane	259	1108.0	Rimane	123	-
C28S Diasterane	259	1002.0	Pimerane	123	-
C29S Diasterane	259	1507.0	Kaurane	123	1832.0
16a Phyllocladane	123	-	Unknown 1	123	-
Beyerene	123	2334.0	Homodrimane	123	23234.0
Fichtelite	123	-	Rearranged Drimane 2	123	4610.0
Nortetracyclane	123	3241.0	C17 Alkylcyclohexane	83	-
Isopimerane	123	-	C22 Alkylcyclohexane	83	-
Norisopimerane	123	-	C29 Alkylcyclohexane	83	-
Drimane	123	10082.0			
Rearranged Drimane 1	123	8163.0			
Eudesmane	123	-			
C15 Alkylcyclohexane	83	-			
C21 Alkylcyclohexane	83	-			
C25 Alkylcyclohexane	83	-			

- = no data IUPAC names corresponding to common names used here are shown at the end of the tables

TABLE 18-2

SATURATE FRACTION SIR GC/MS DATA - SEDIMENTS

CALCULATED DATA

WELL = LA BELLA-1 DEPTH 1(m) = 2159.00 DEPTH UNIT = Metres
 COUNTRY = Australia DEPTH 2(m) = 2159.00 DATE OF JOB = Oct 93
 BASIN = Otway

----- TERPANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% Ts / (Ts + Tm)	191	13.23
% C29 M / (C29 H + C29 M)	191	18.24
% C30 M / (C30 H + C30 M)	191	21.36
% C31S H / (C31S H + C31R H)	191	57.95
% C31S H / (C31S H + C31R H)	205	-
% C32S H / (C32S H + C32R H)	191	57.82
% U1-U4 / (U1-U4 + C30 H)	191	-
% U1 / (U1 + C30 H)	191	-
% U2 / (U2 + C30 H)	191	-
% U3 / (U3 + C30 H)	191	9.30
% U4 / (U4 + C30 H)	191	5.92
% C29 H / (C29 H + C30 H)	191	46.87
% C31 2-MeH / (C31 2-MeH + C30 H)	191, 205	-
% C29 BB / (C29 BB + C 29H + C29 M)	191	4.18
% C29 DeMe / (C29 DeMe + C29H)	177	-
% C28 H's / (C28 H's + C30 H)	191	33.12
% (Ts + Tm + C28 H's) / C29(H + M) + C30(H + M)	191	57.15
% Oleanane (18a) / (Oleanane + C30H)	191	-
% Drimane / Homodrimane	123	43.39
% Rea. Drimanes / (Drimane + Homodrimane)	123	38.34
% C22 Alkycyclohex. / C30 H	83, 191	-
% C29 Alkycyclohex. / C30 H	83, 191	-
% C23-C29 Tricyclics / C30 H	191	-
% (C30 H + C30 M) / (C29(NS's + IS's + DS's))	191, 217	251.47

----- STERANE PARAMETERS -----

PARAMETER	ION(s)	VALUE
% C27 ST's / (C27 + C28 + C29) ST's	217	-
% C28 ST's / (C27 + C28 + C29) ST's	217	-
% C29 ST's / (C27 + C28 + C29) ST's	217	-
% C27S NS / (C27S NS + C27R NS)	217	43.13
% C28S NS / (C28S NS + C28R NS)	217	24.88
% C29S NS / (C29S NS + C29R NS)	217	35.66
% C27 NS's / C29 NS's	217	44.94
% C27 IS's / C29 IS's	217	-
% C27 DS's / C29 DS's	217	-
% C27 DS's / C27 ST's	217	-
% C28 DS's / C28 ST's	217	-
% C29 DS's / C29 ST's	217	21.85
% C27 IS's / (C27 IS's + C27 NS's)	217	-
% C28 IS's / (C28 IS's + C28 NS's)	217	-
% C29 IS's / (C29 IS's + C29 NS's)	217	40.01

NOTES : H = Hopane M = Moretane Me = Methyl NS = Normal Sterane
 IS = Iso Sterane DS = Dia Sterane ST = NS + IS + DS U = Unknown
 - = no data available

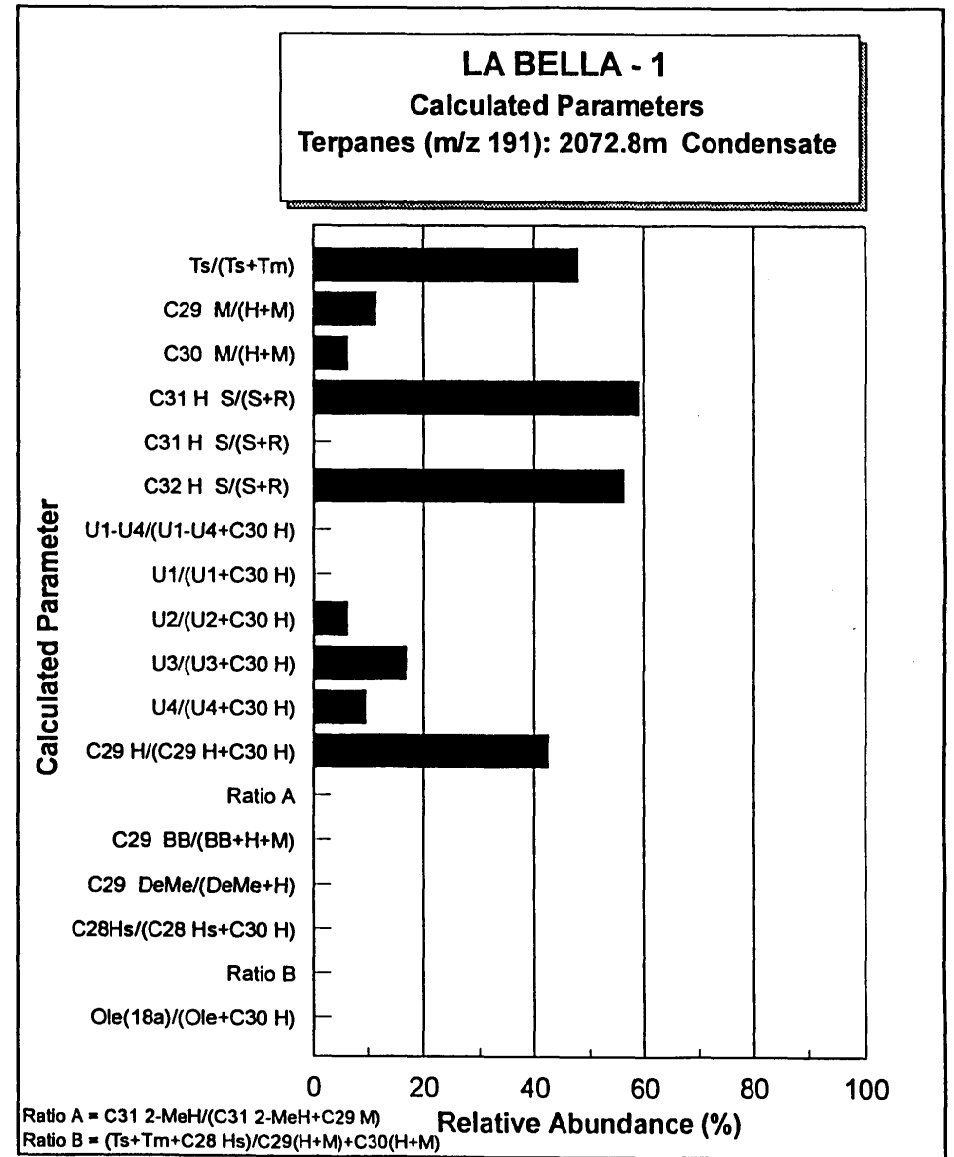
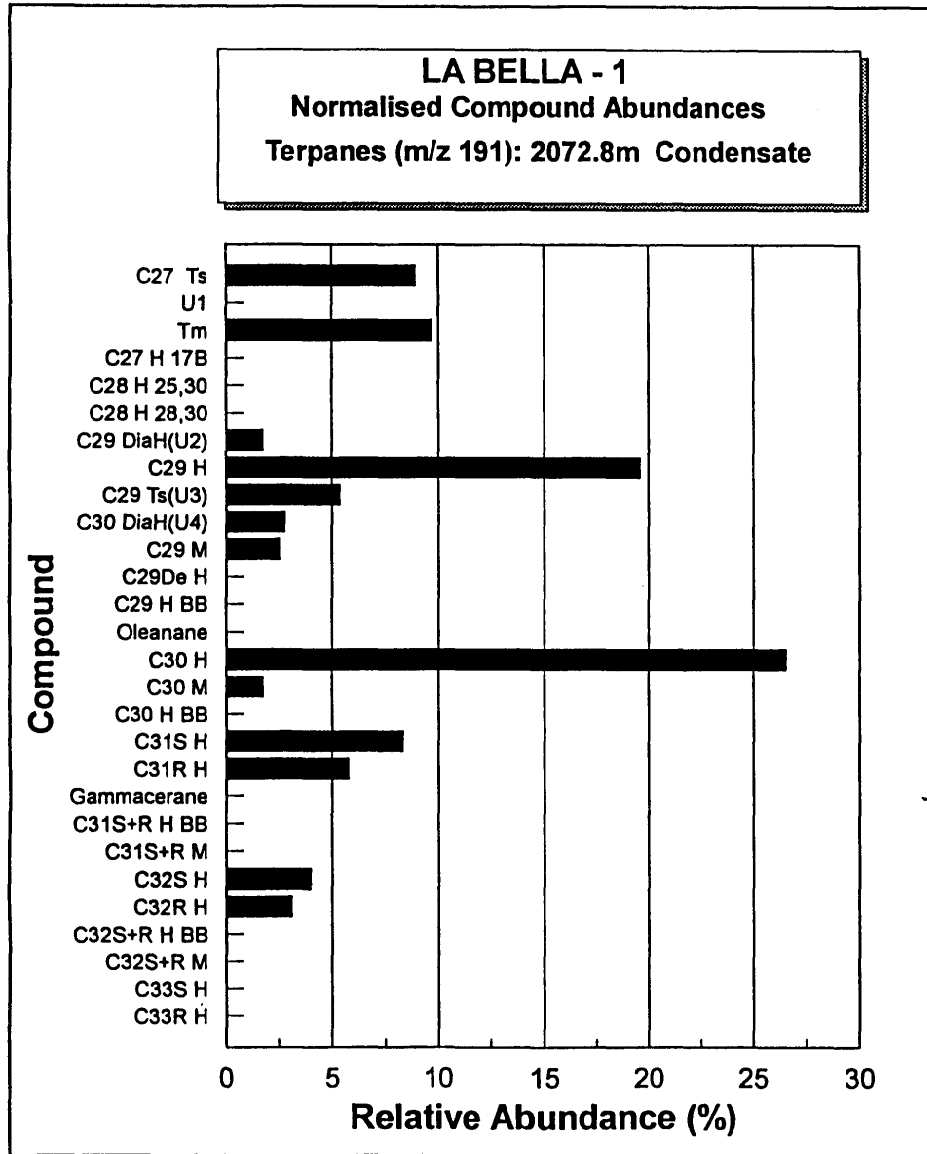


FIGURE 34a

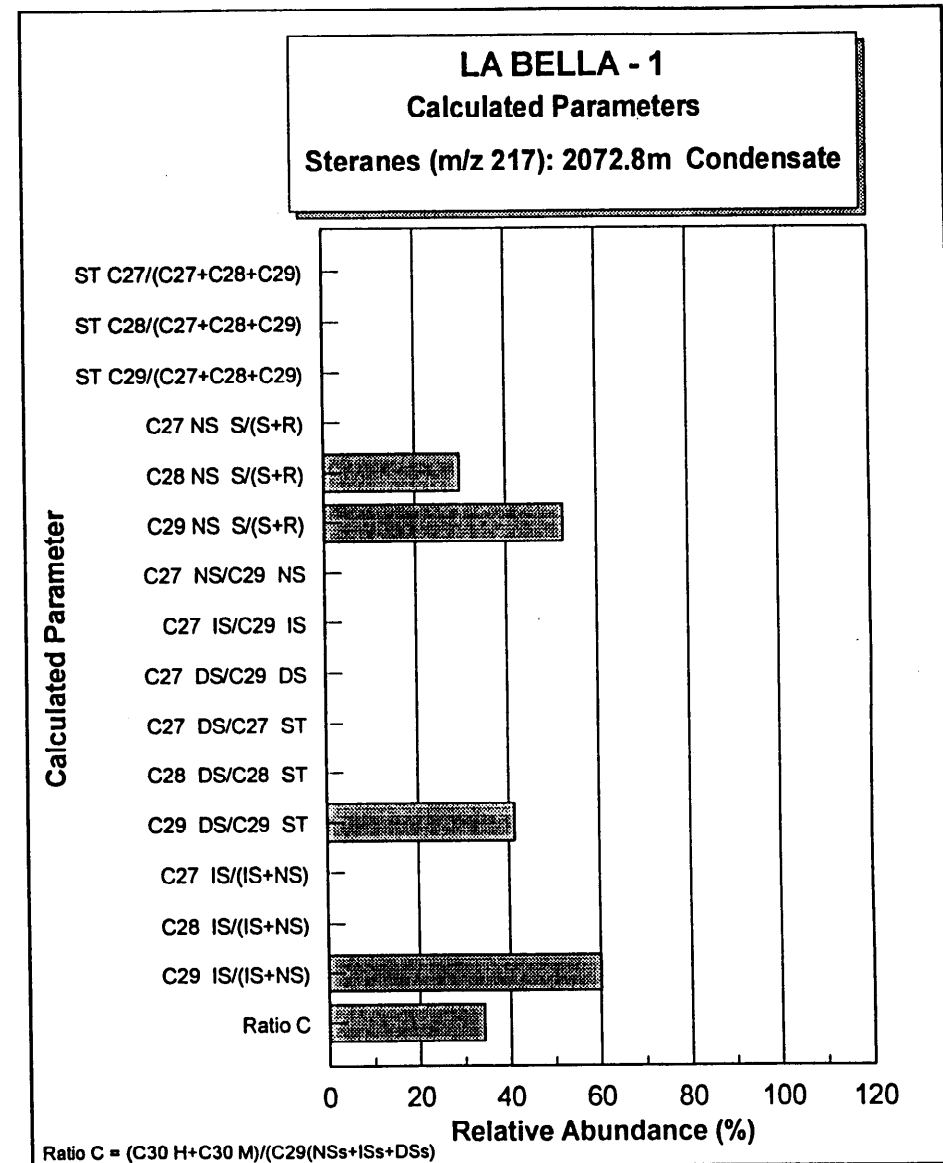
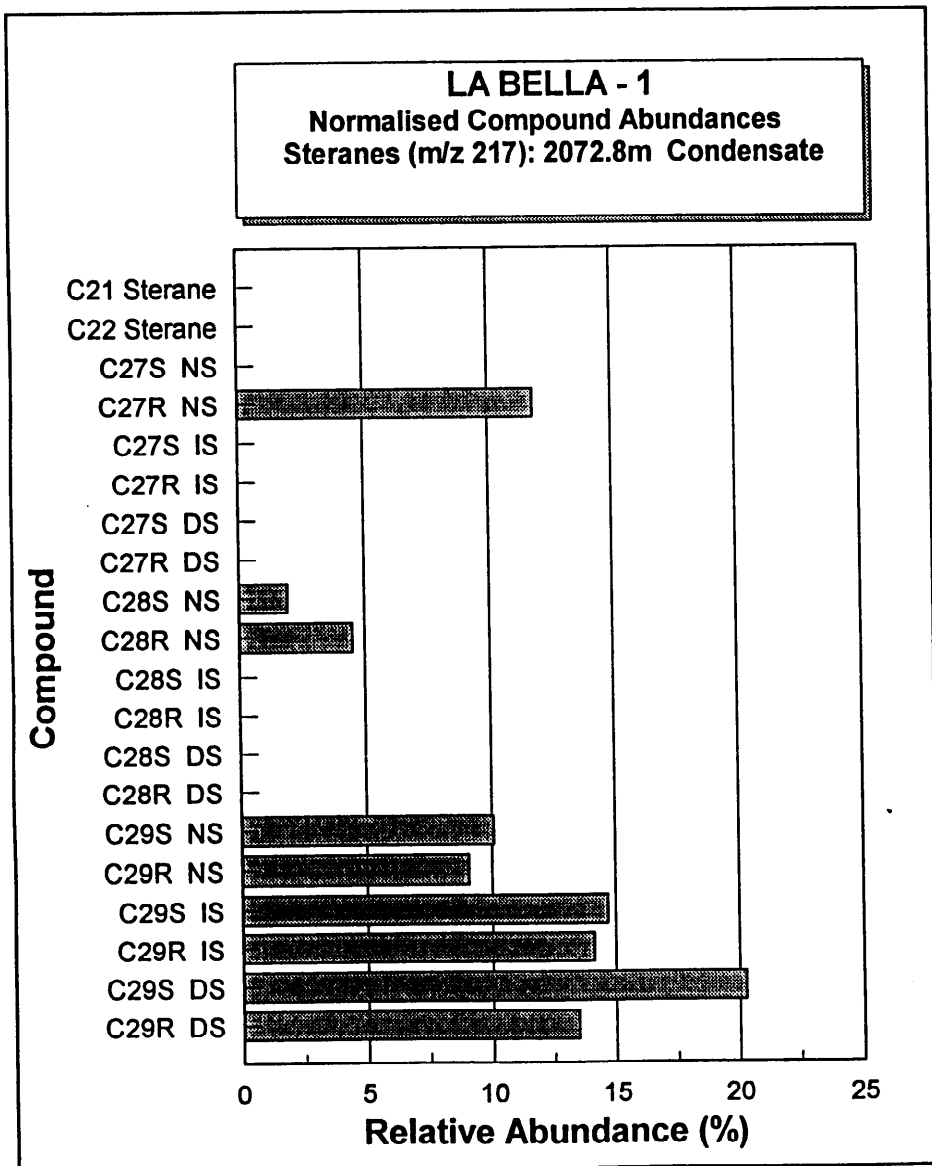


FIGURE 34b

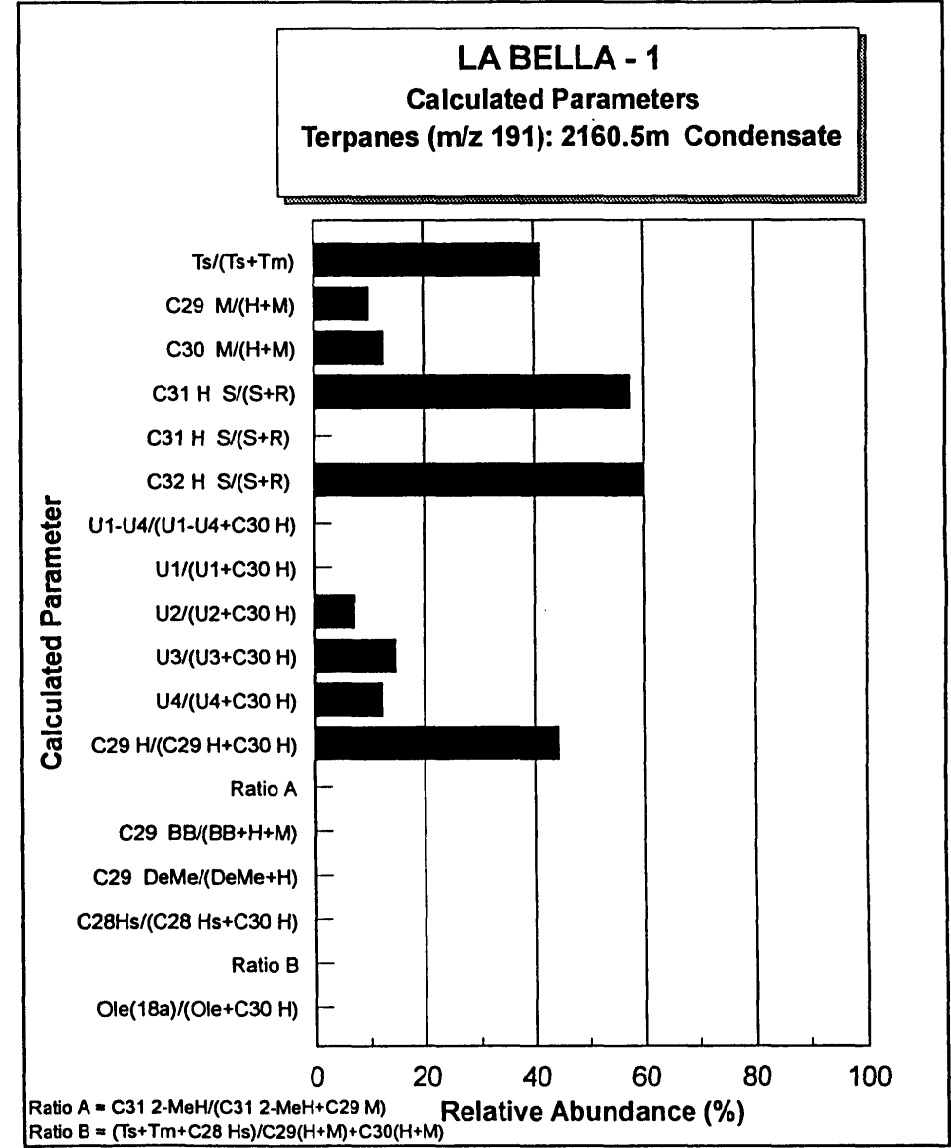
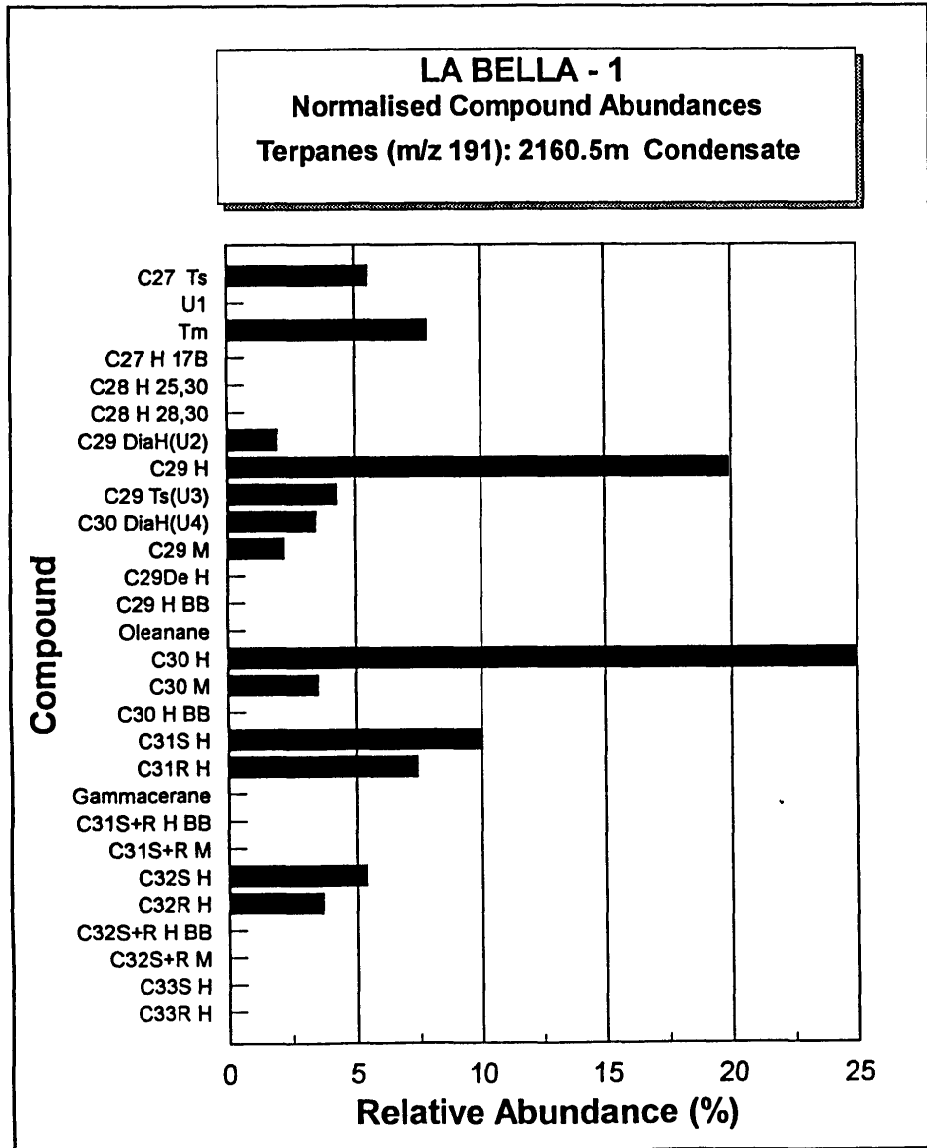


FIGURE 35a

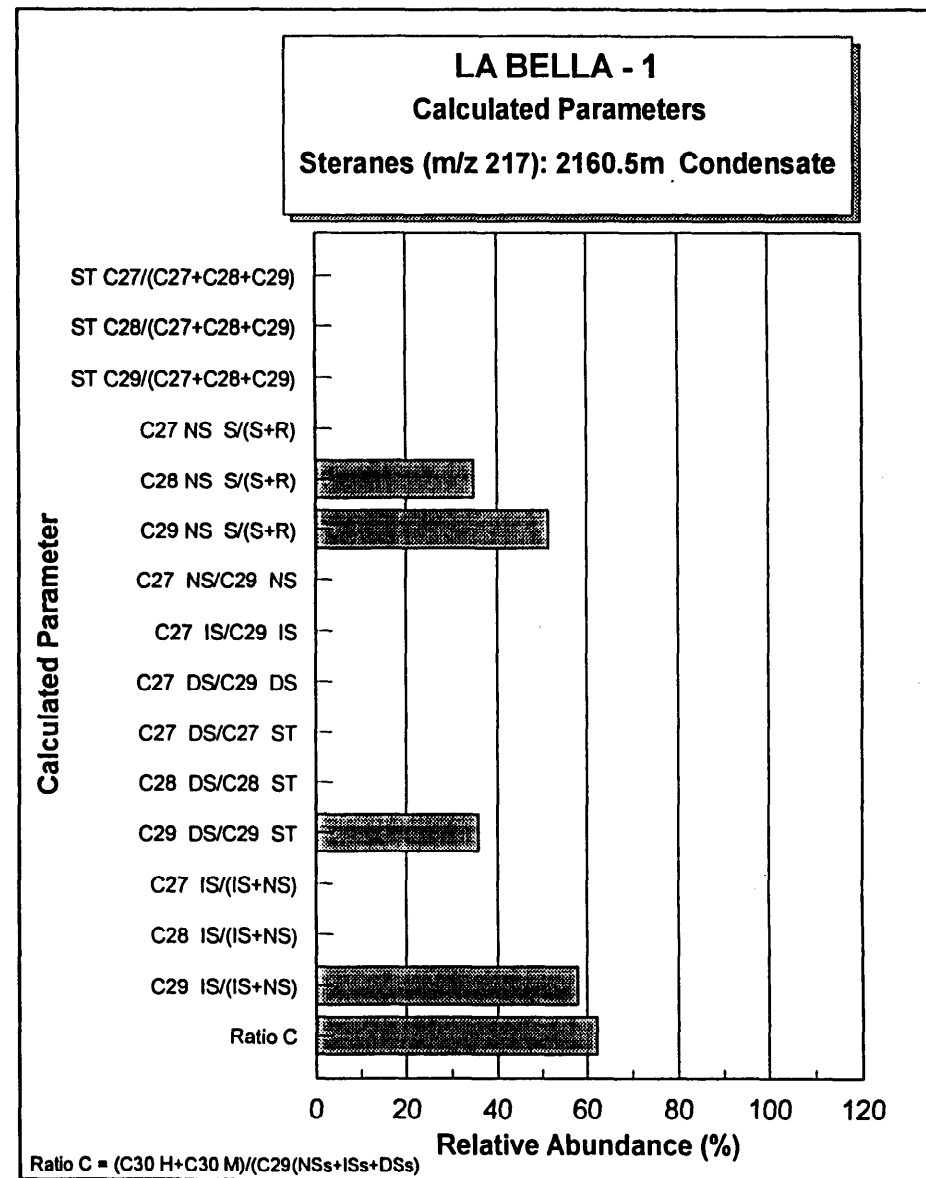
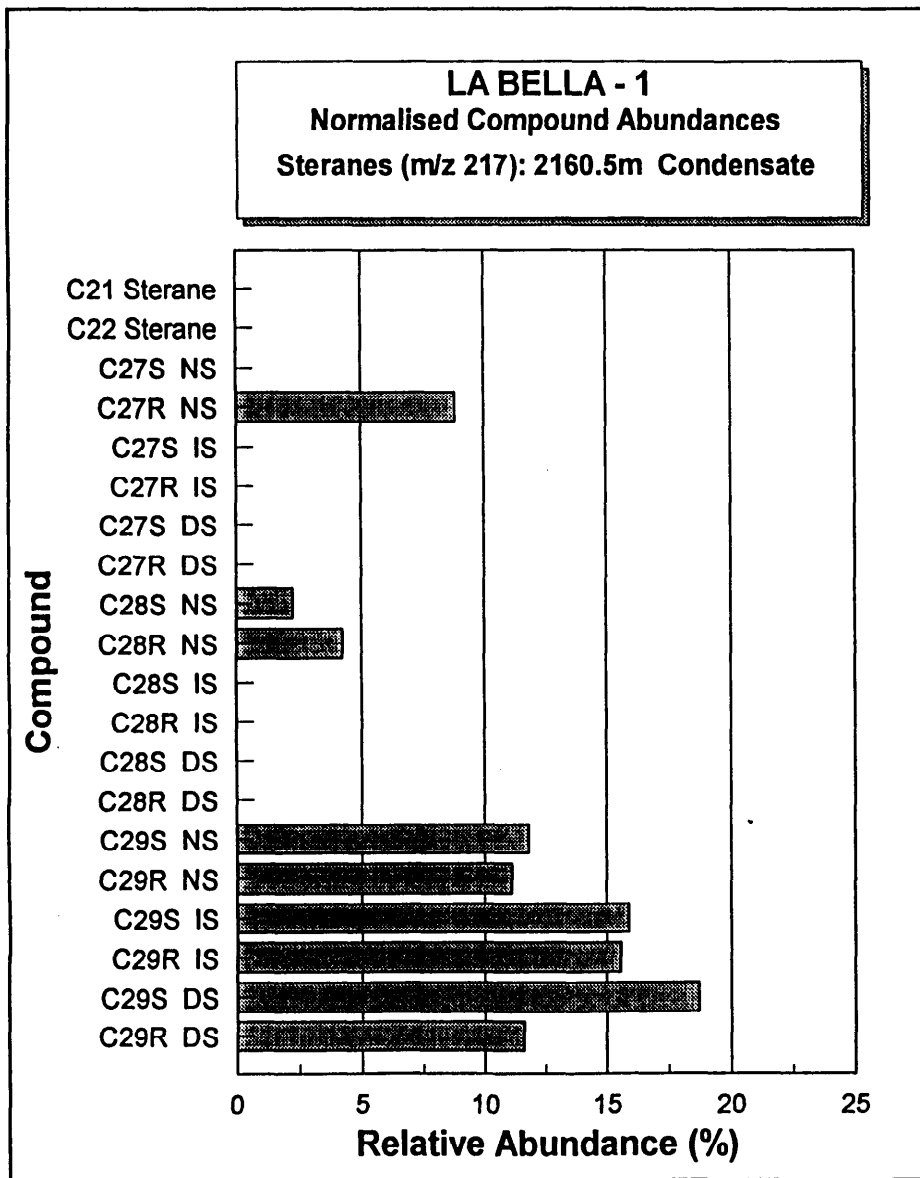


FIGURE 35b

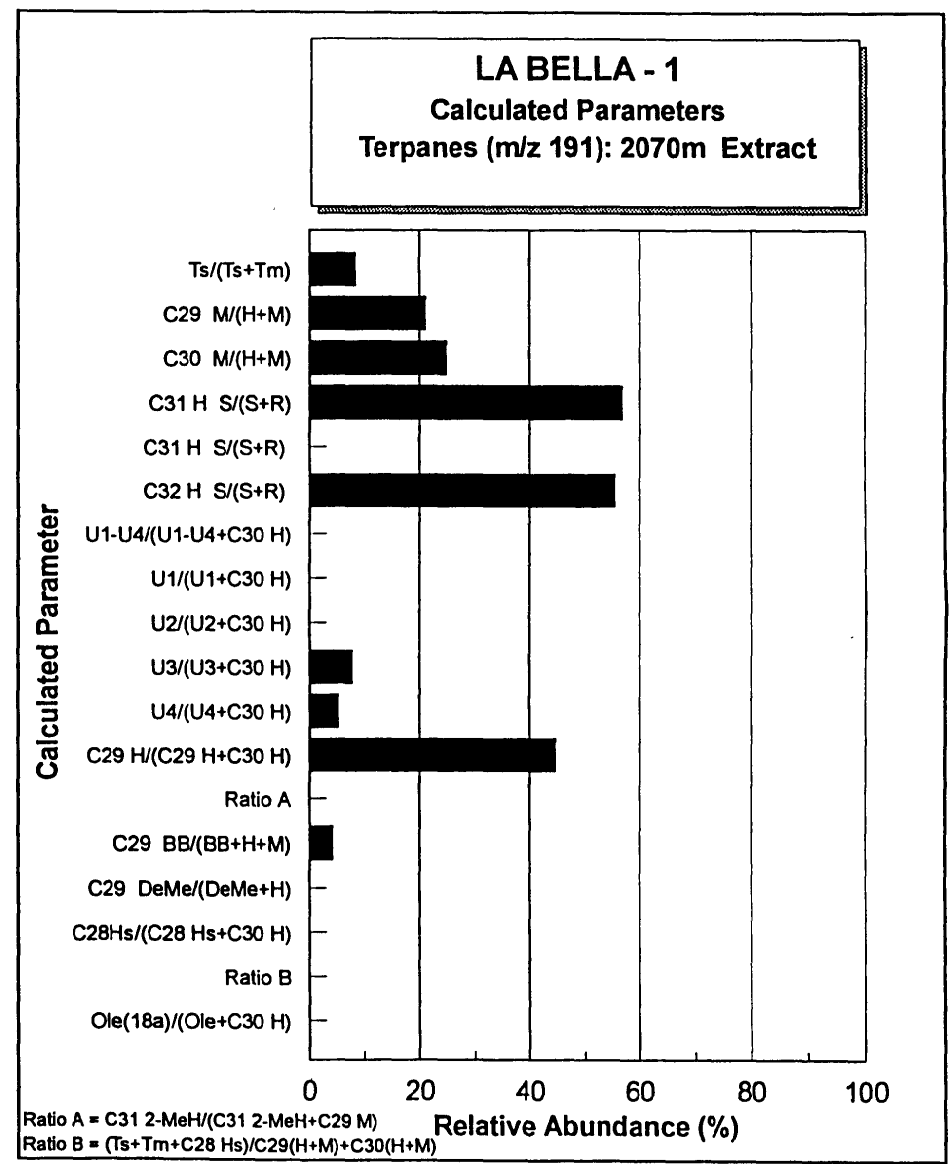
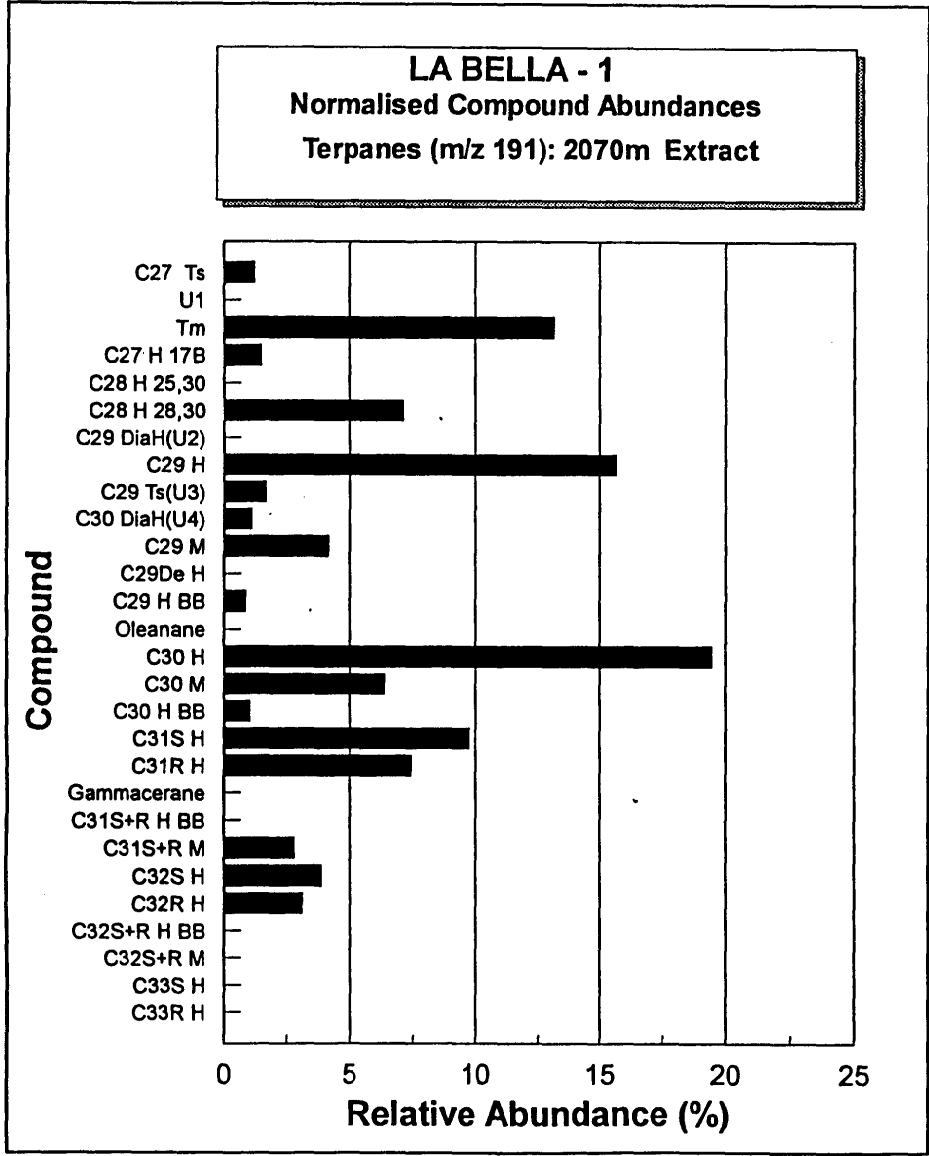


FIGURE 36a

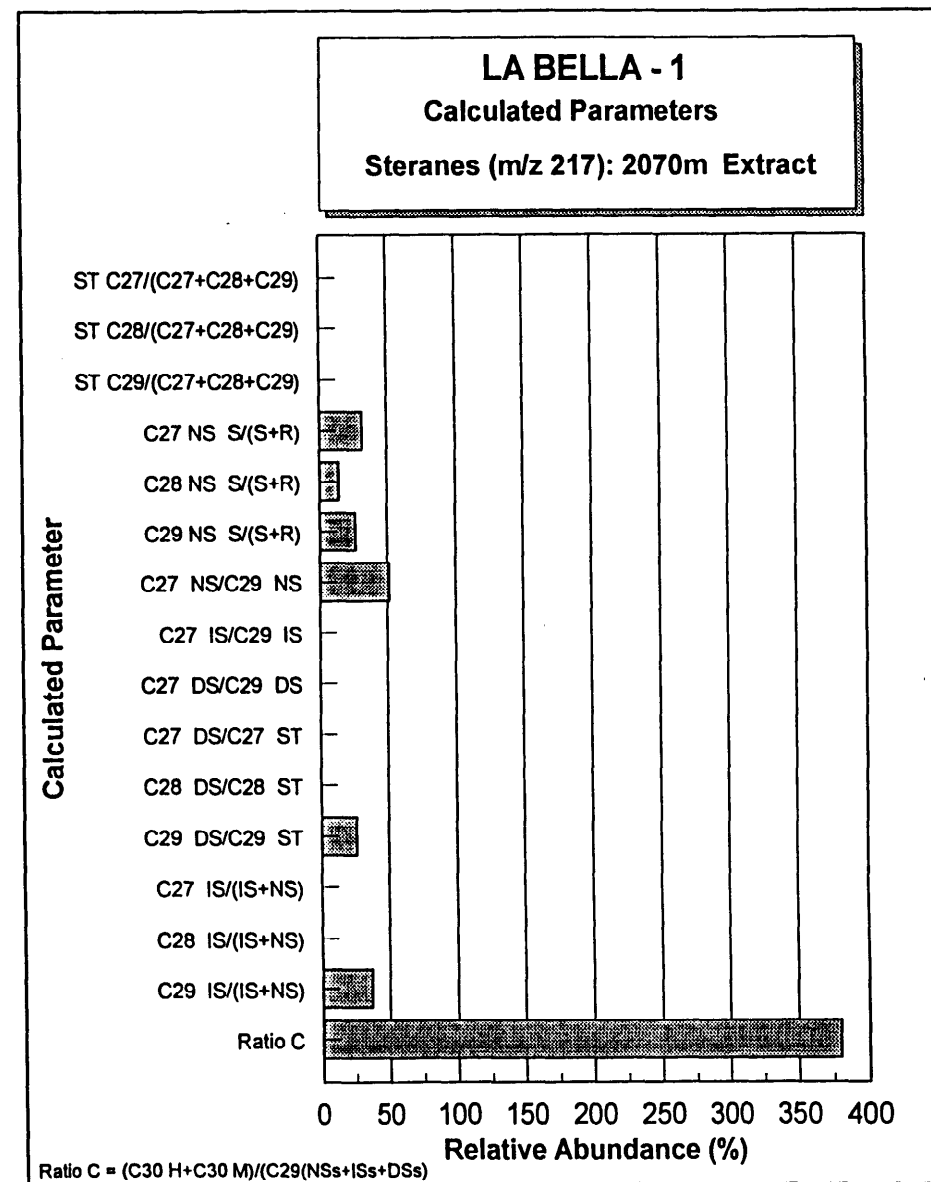
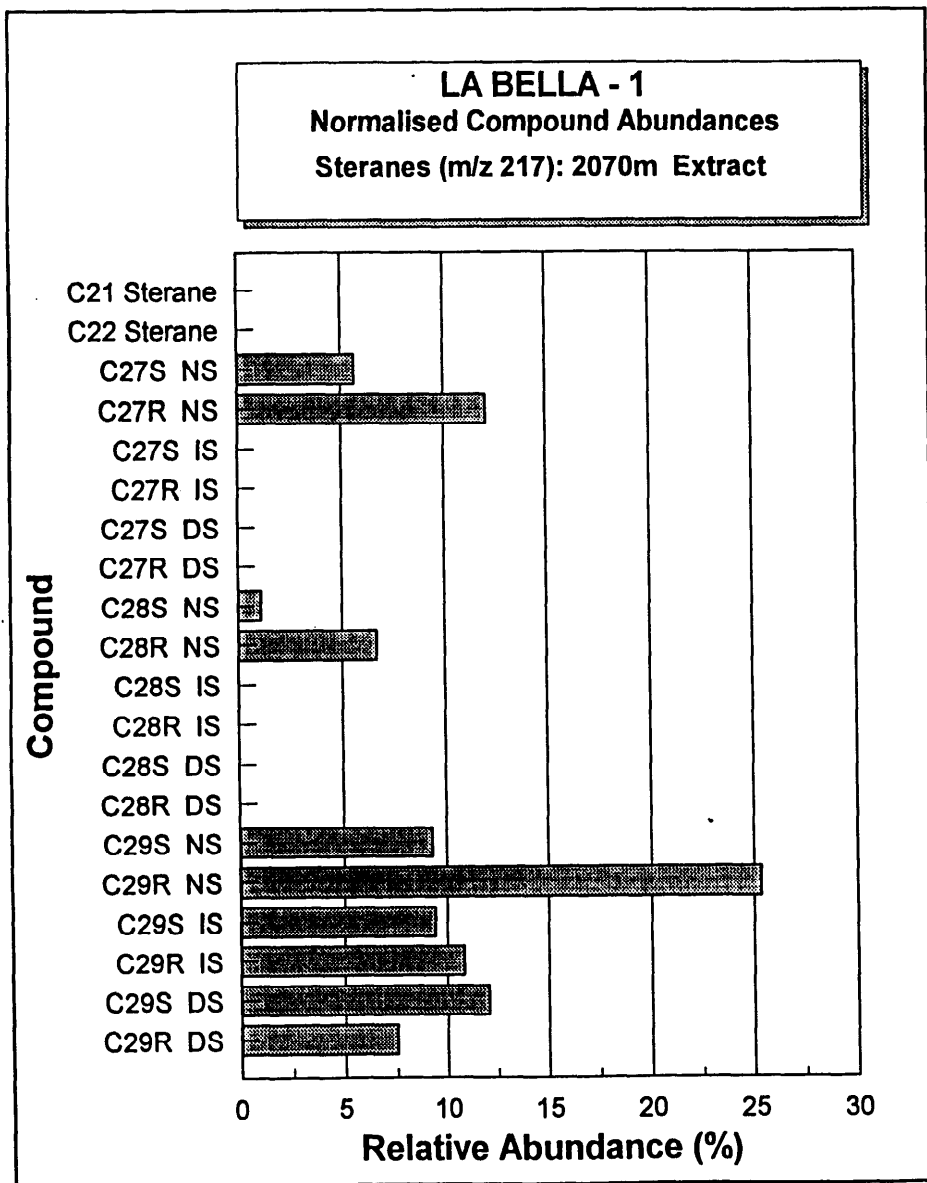


FIGURE 36b

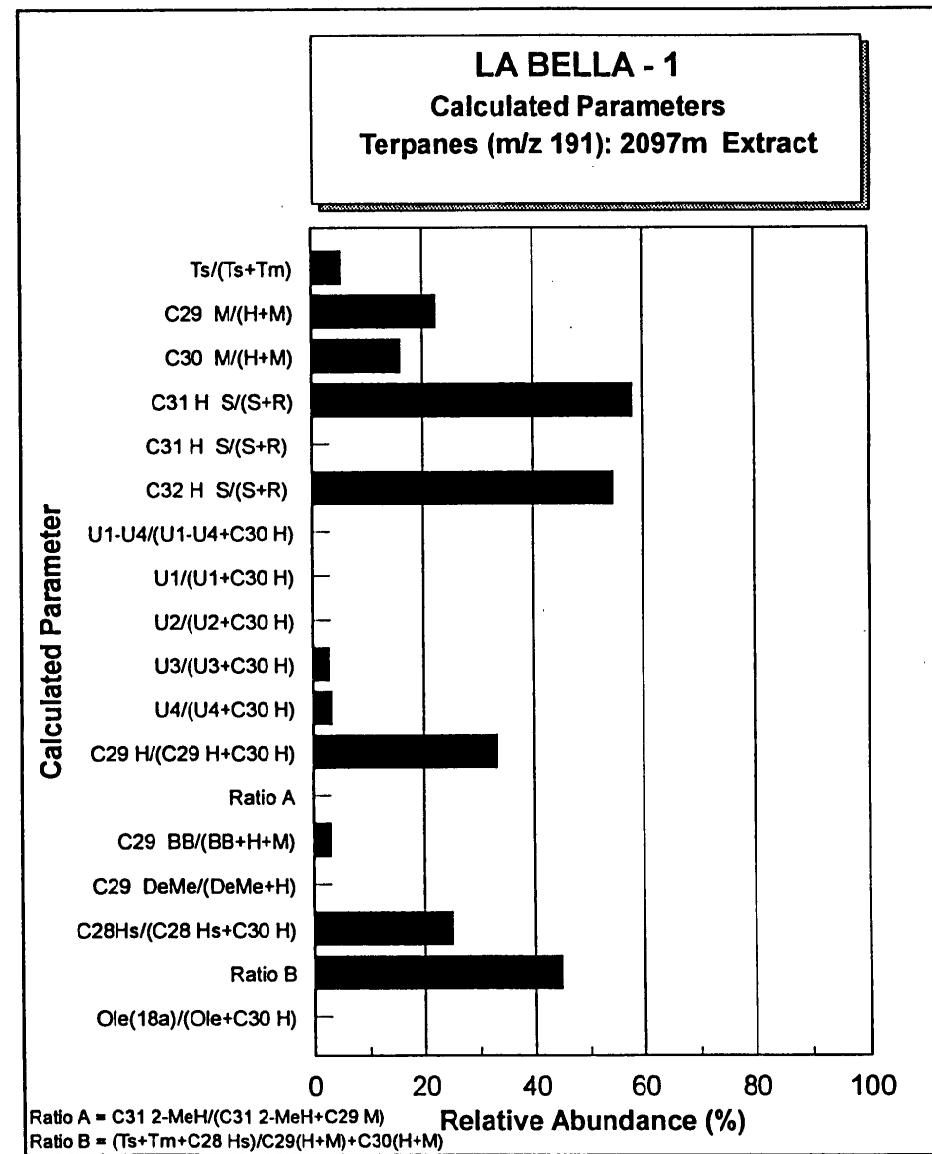
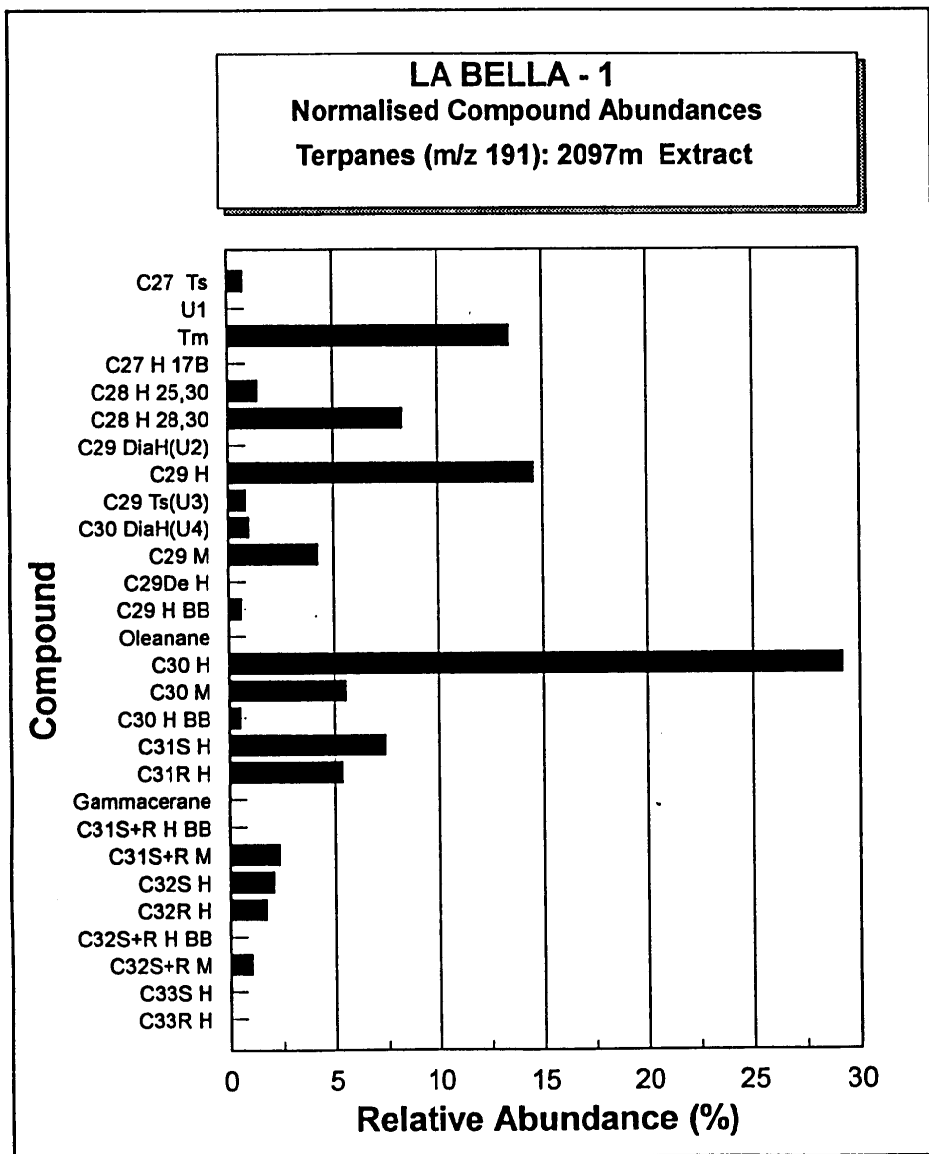


FIGURE 37a

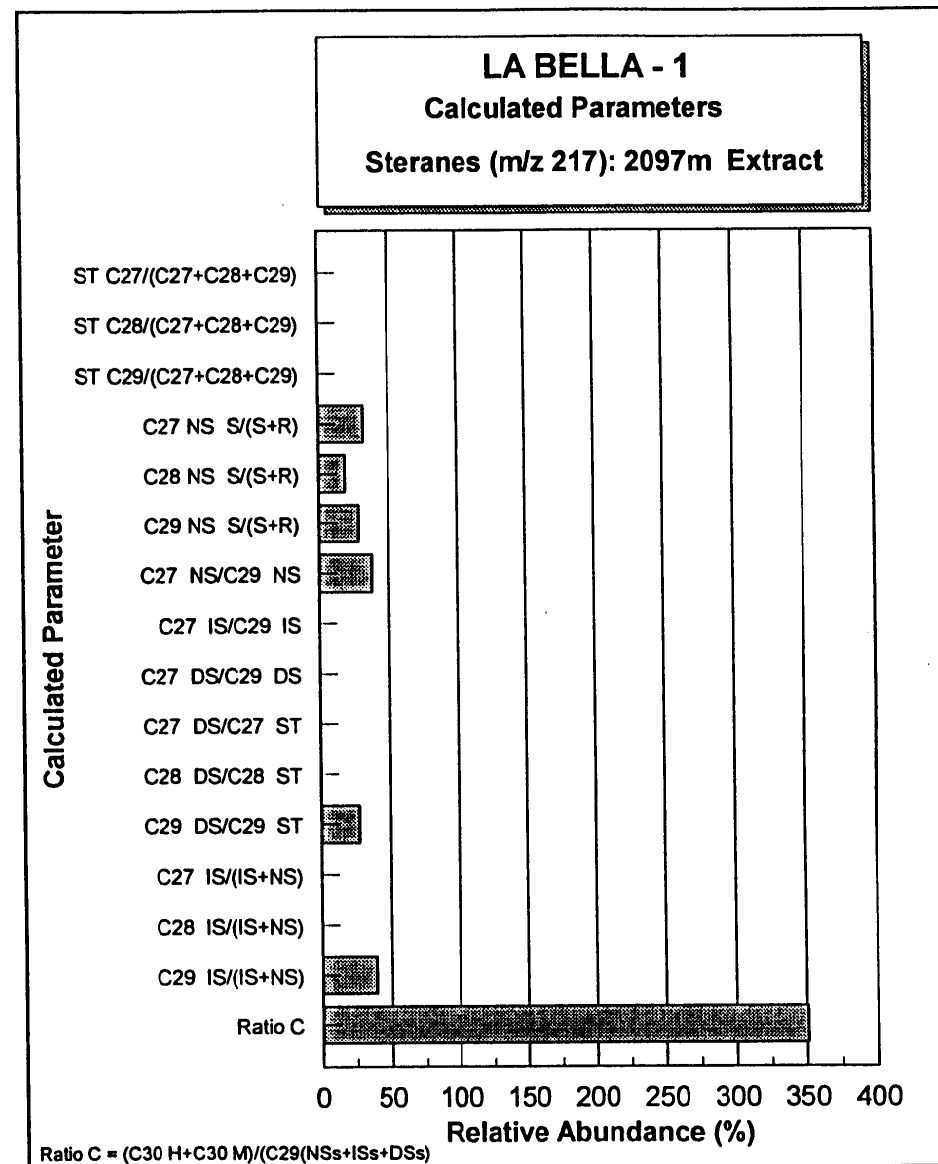
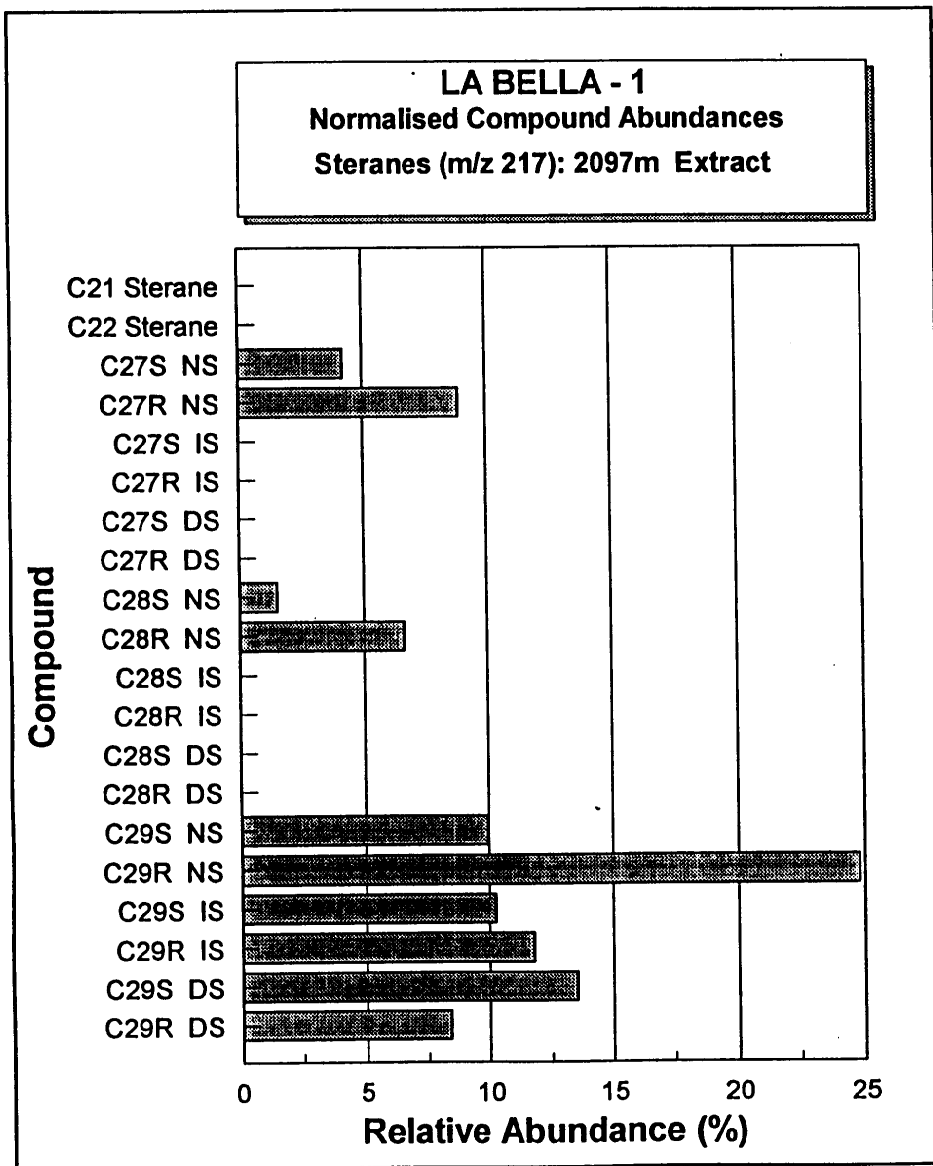


FIGURE 37b

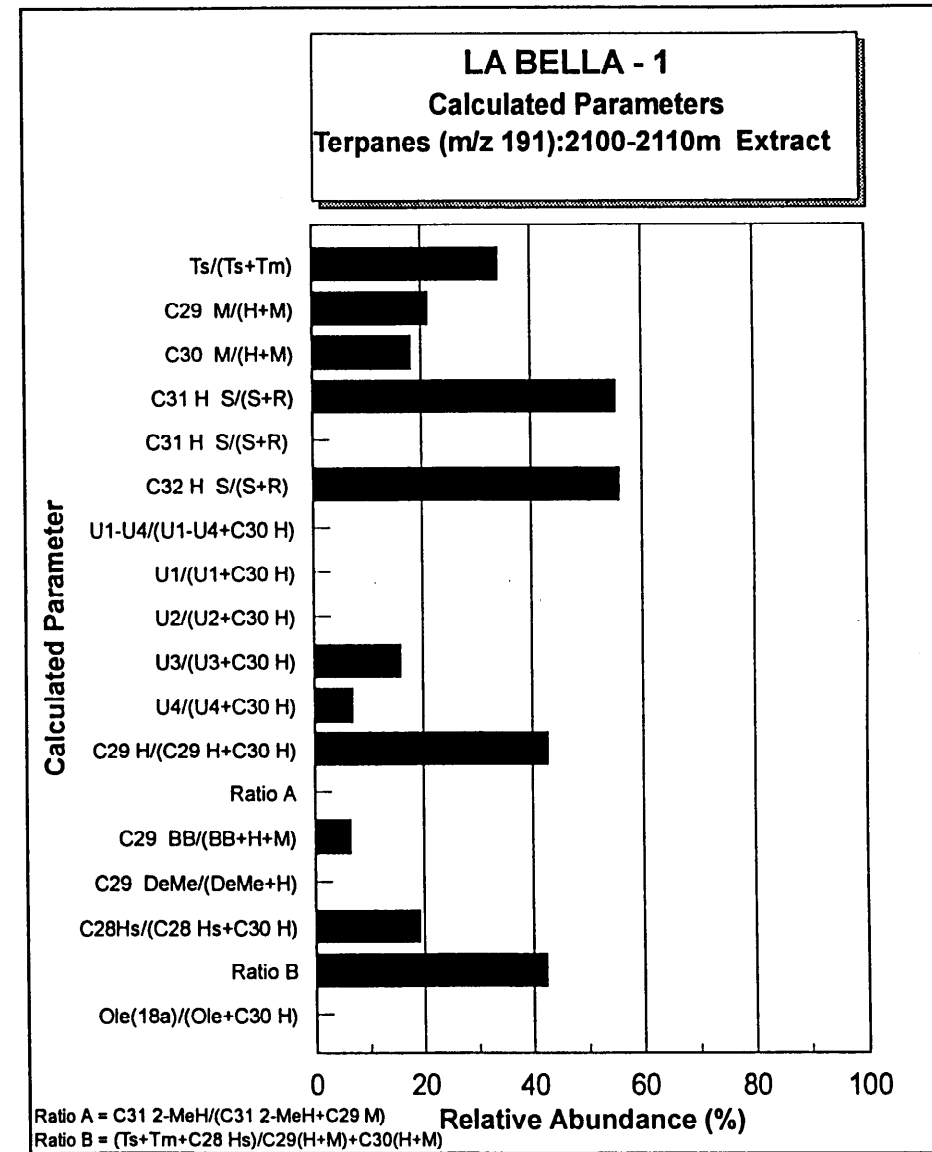
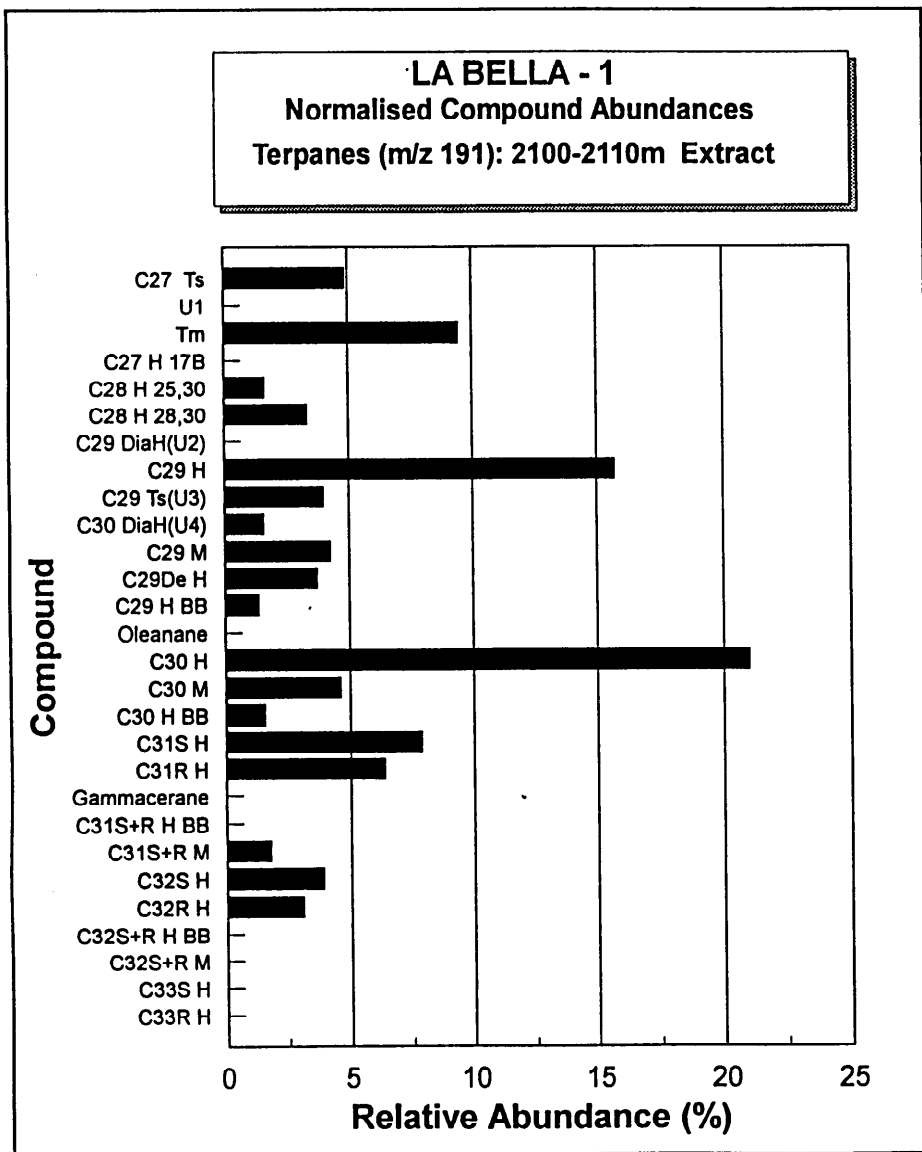
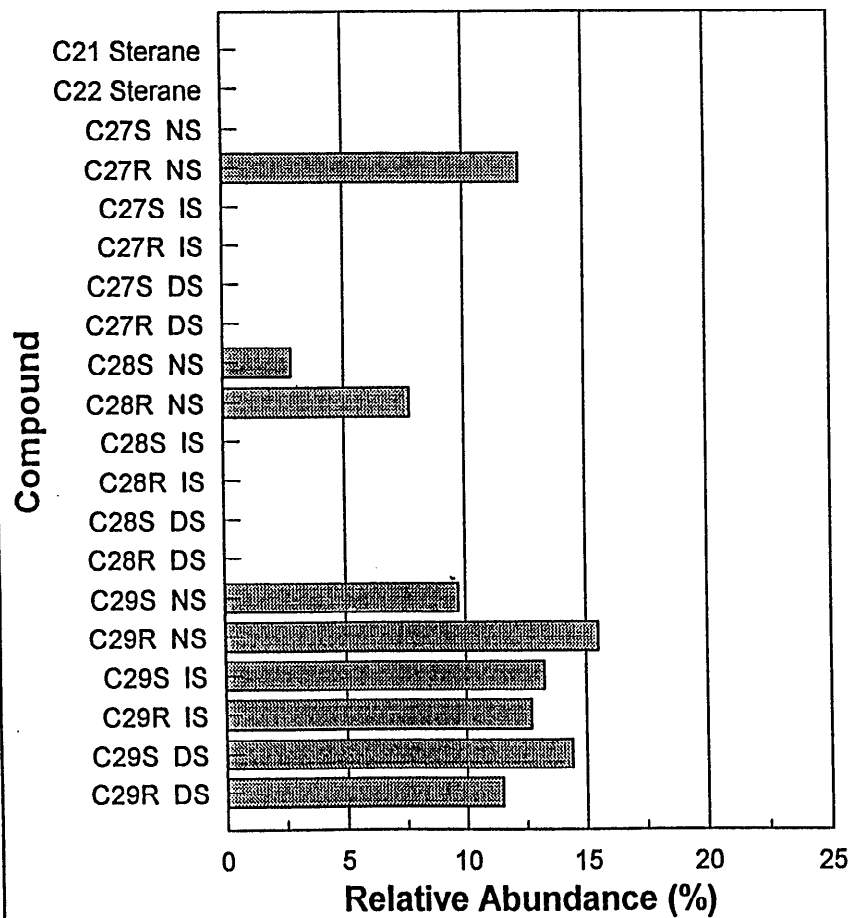


FIGURE 38a

LA BELLA - 1
Normalised Compound Abundances
Steranes (m/z 217): 2100-2110m Extract



- ST C27/(C27+C28+C29)
- ST C28/(C27+C28+C29)
- ST C29/(C27+C28+C29)
- C27 NS S/(S+R)
- C28 NS S/(S+R)
- C29 NS S/(S+R)
- C27 NS/C29 NS
- C27 IS/C29 IS
- C27 DS/C29 DS
- C27 DS/C27 S1
- C28 DS/C28 S1
- C29 DS/C29 S1
- C27 IS/(IS+NS)
- C28 IS/(IS+NS)
- C29 IS/(IS+NS)
- Ratio C
- Ratio C = (C30 H+C30 M)/(C29

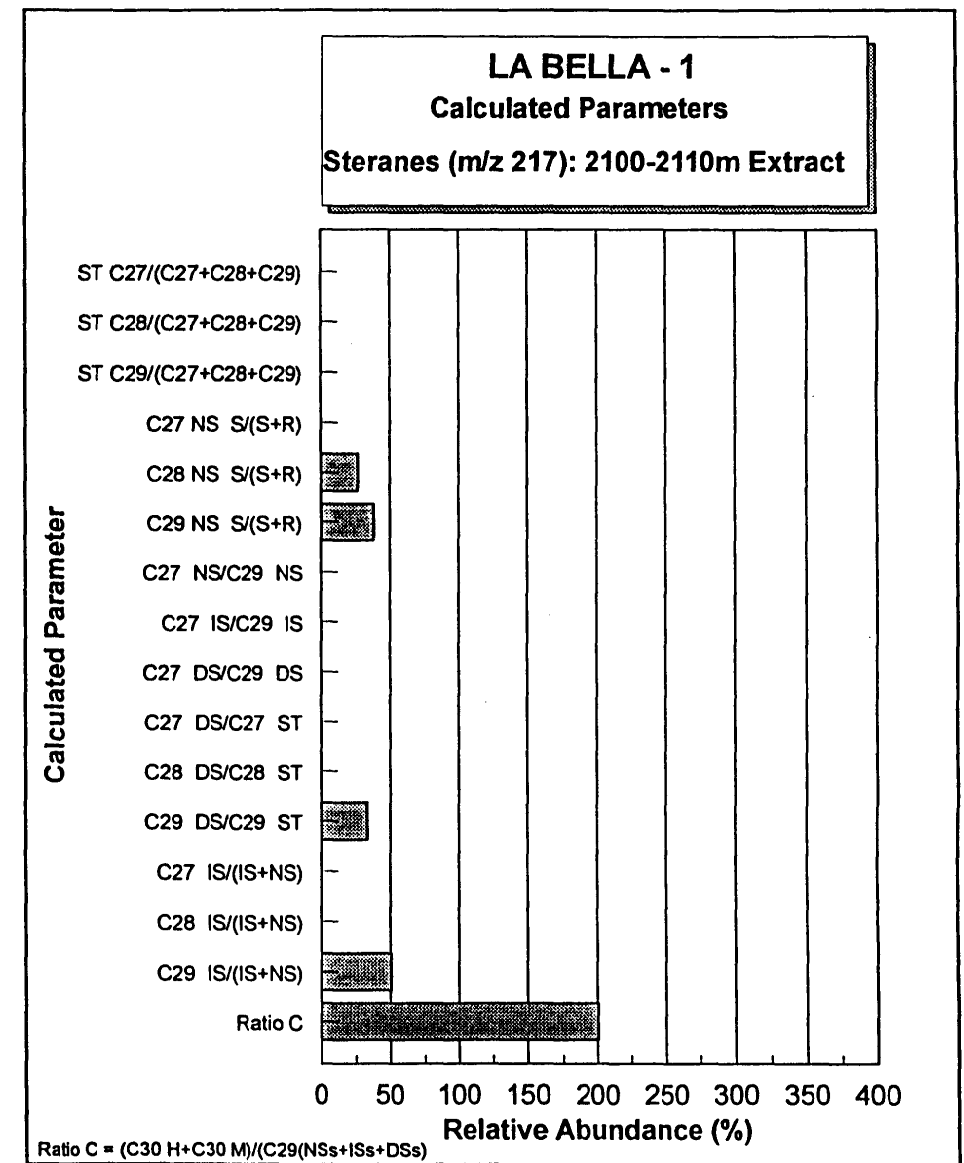
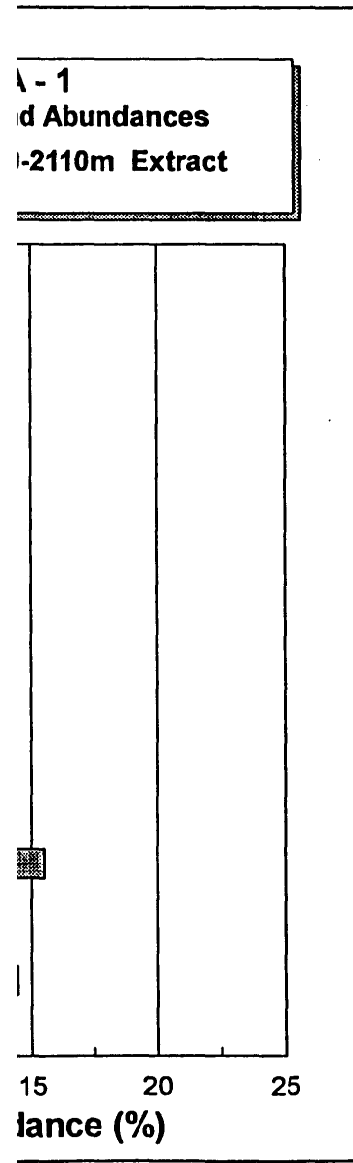


FIGURE 38b

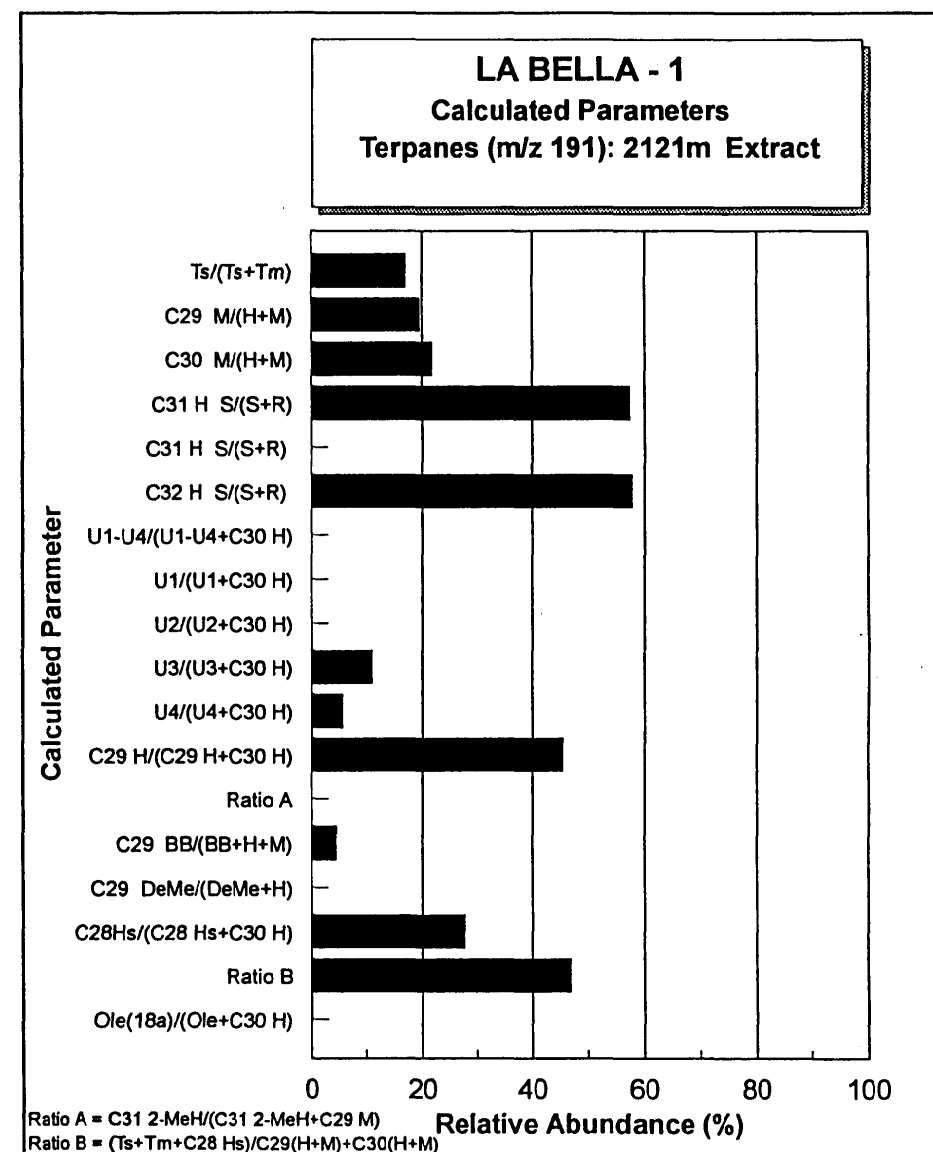
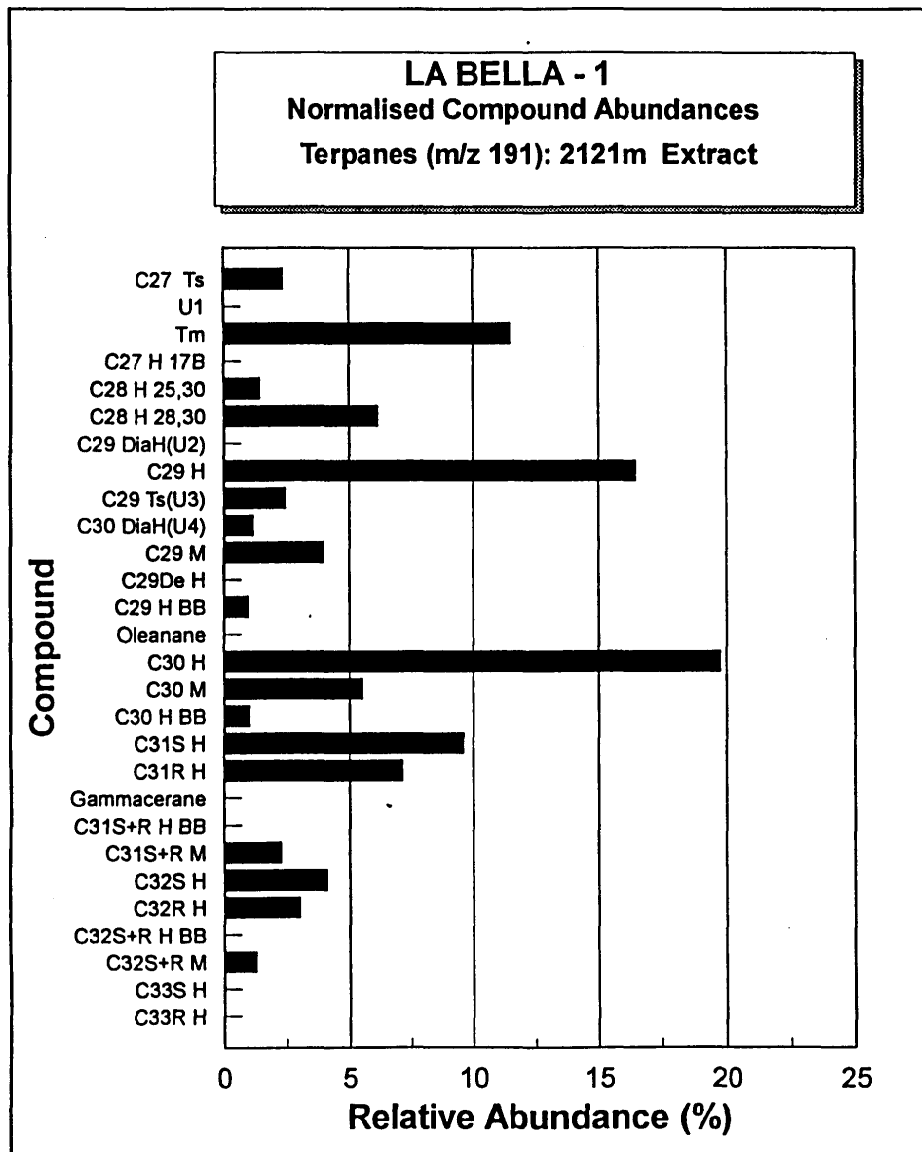


FIGURE 39a

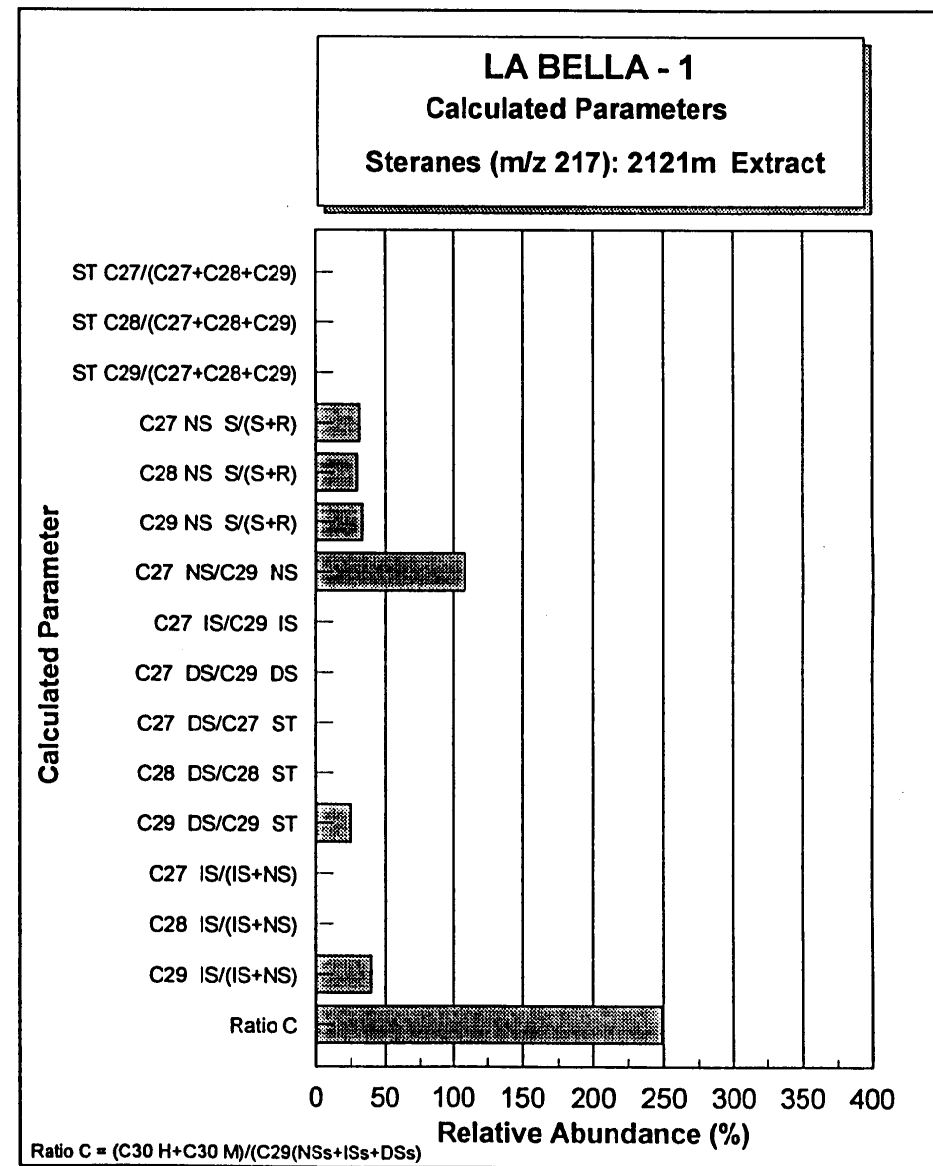
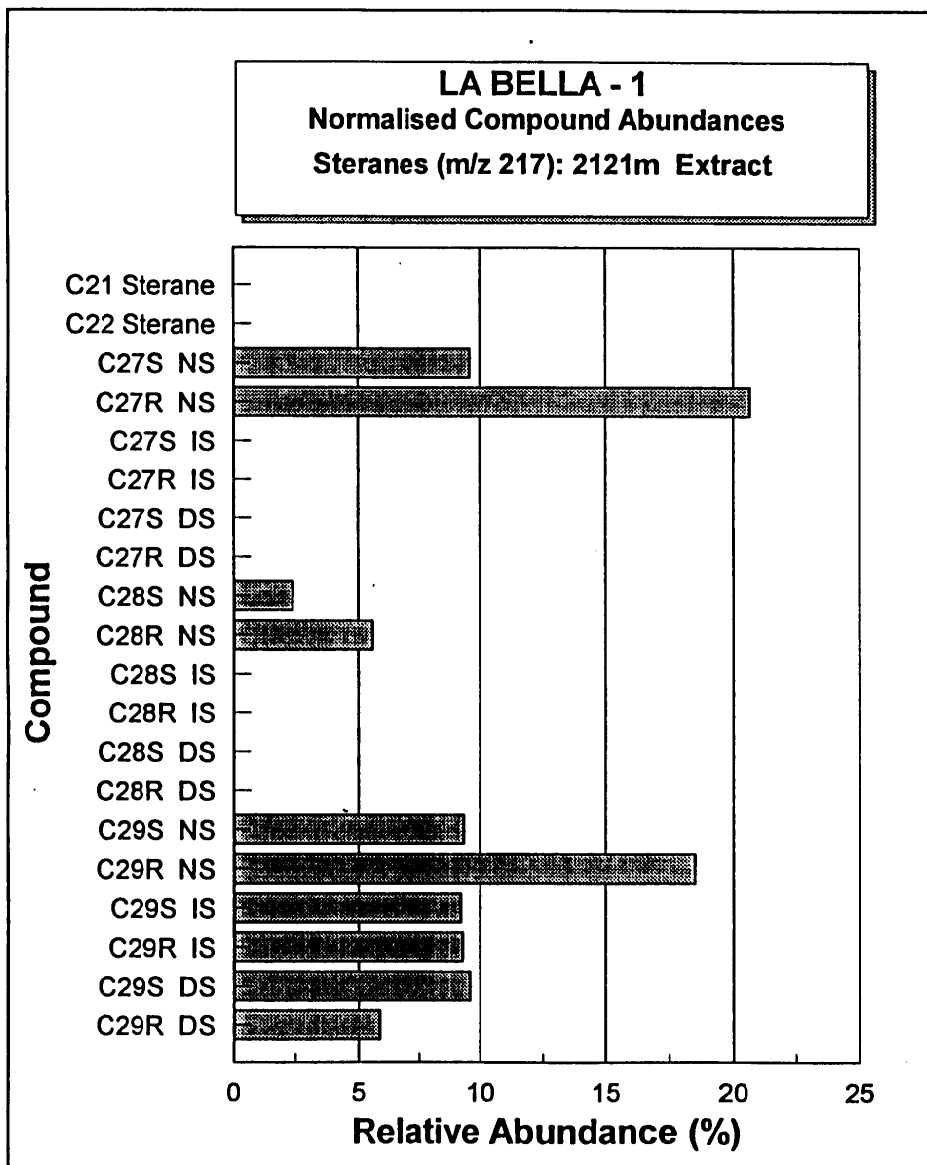


FIGURE 39b

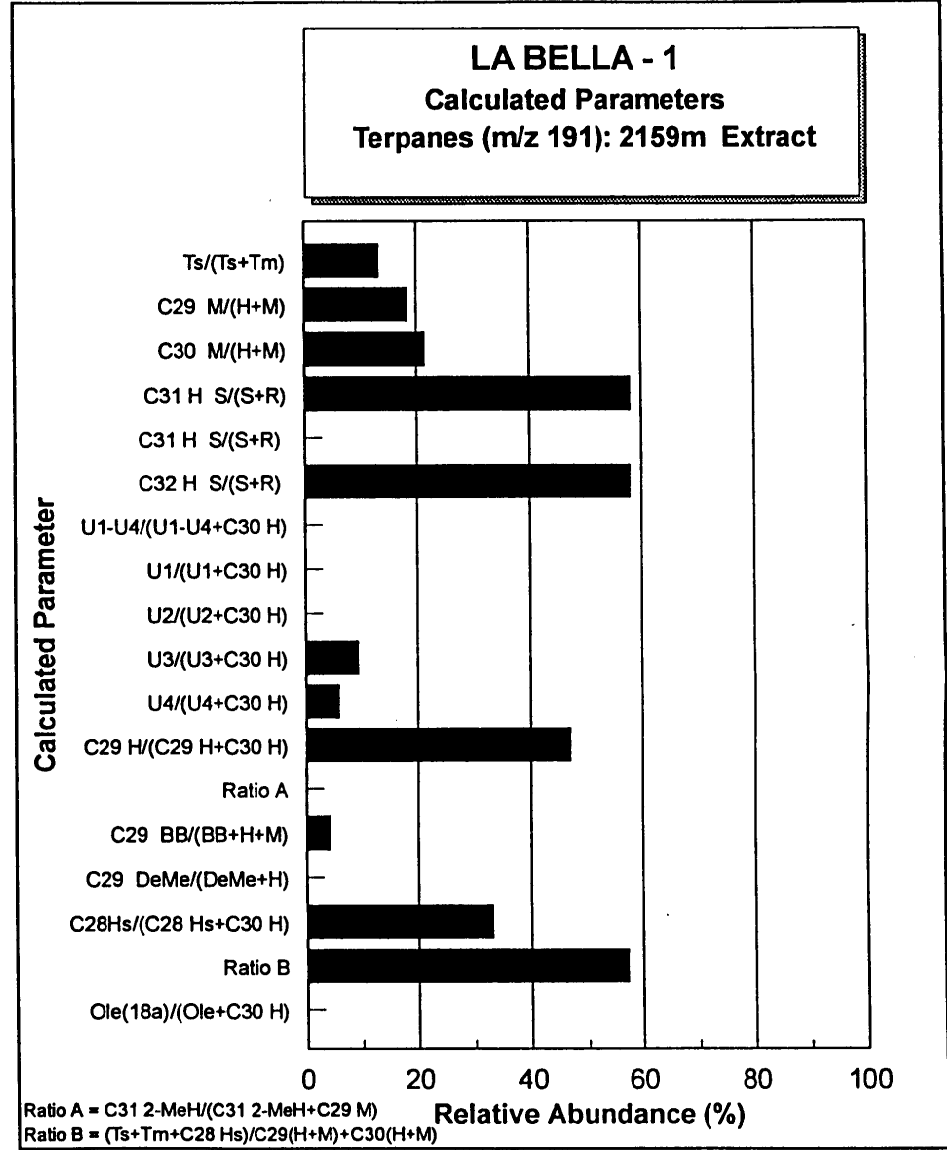
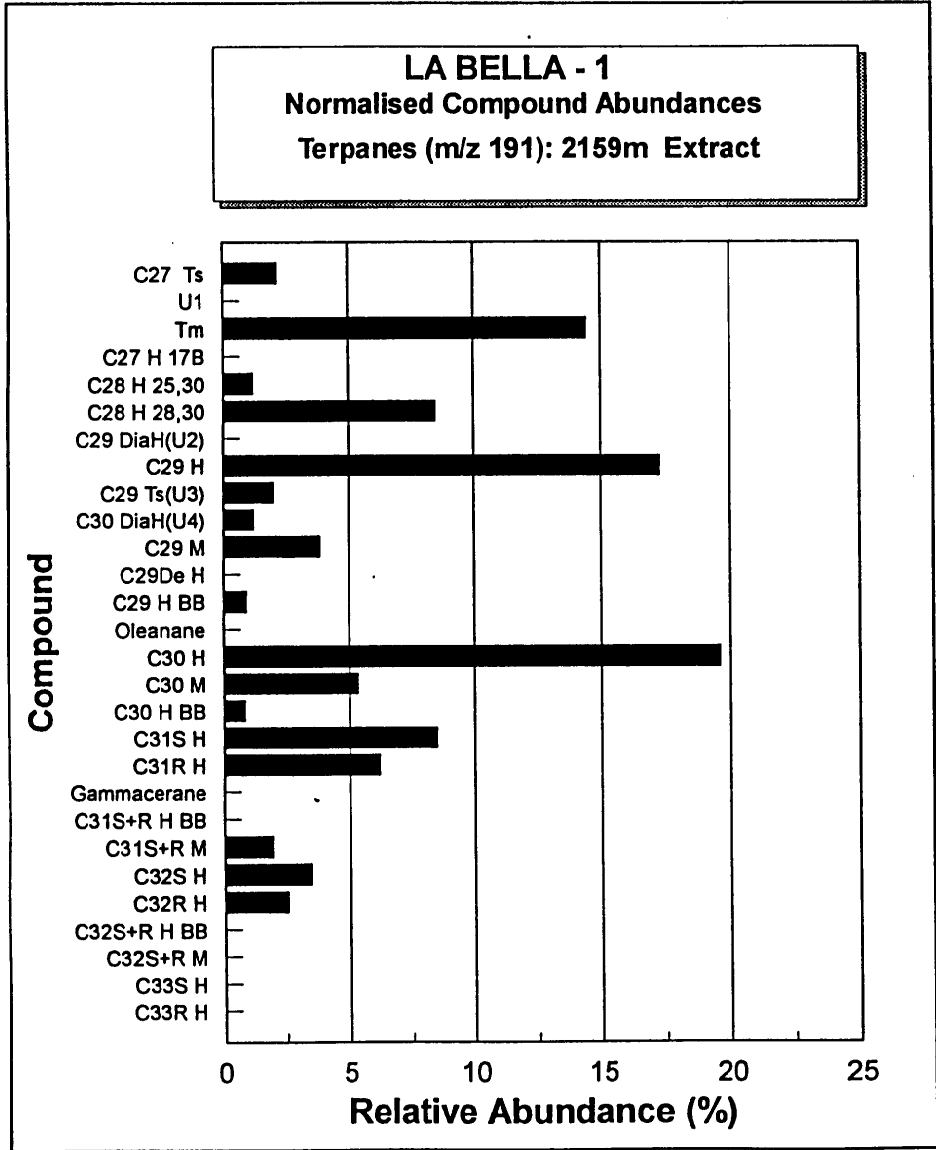


FIGURE 40a

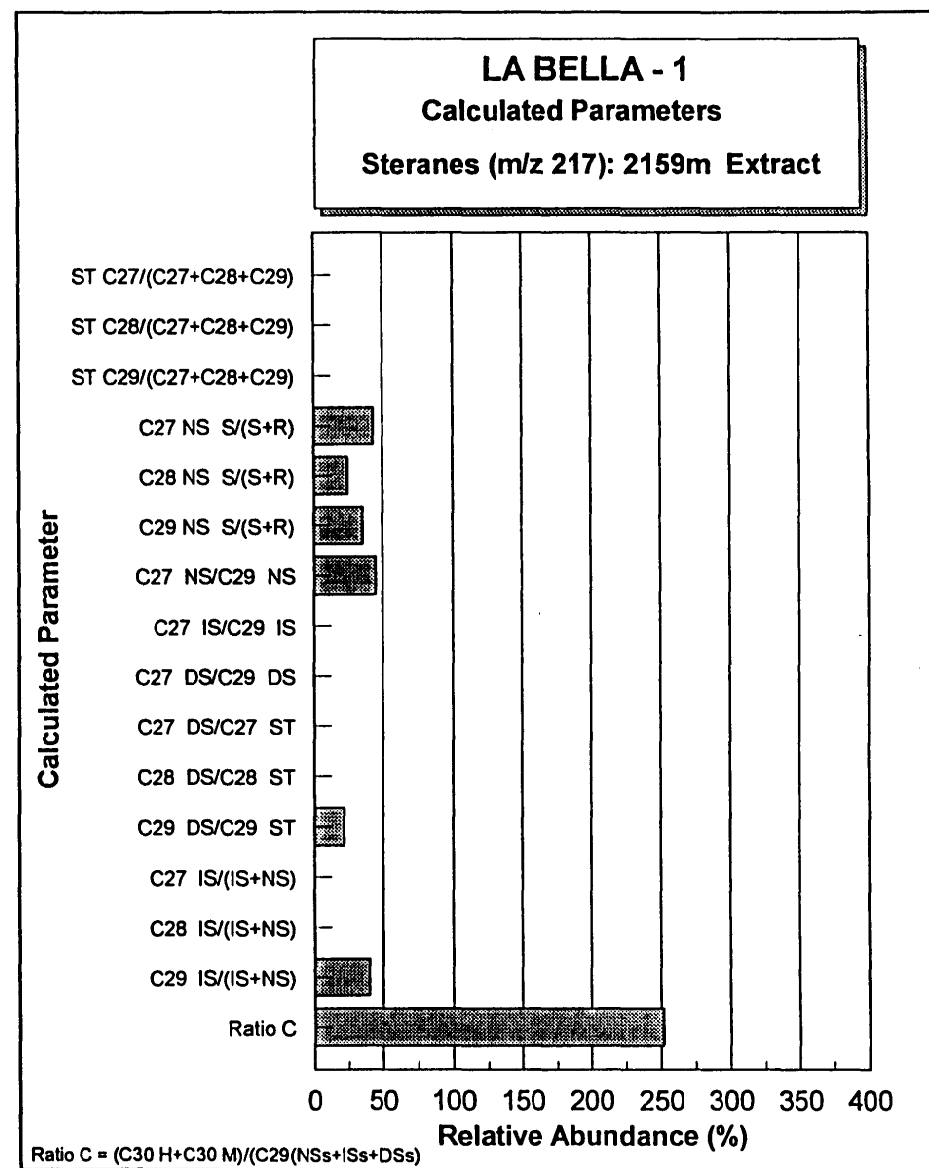
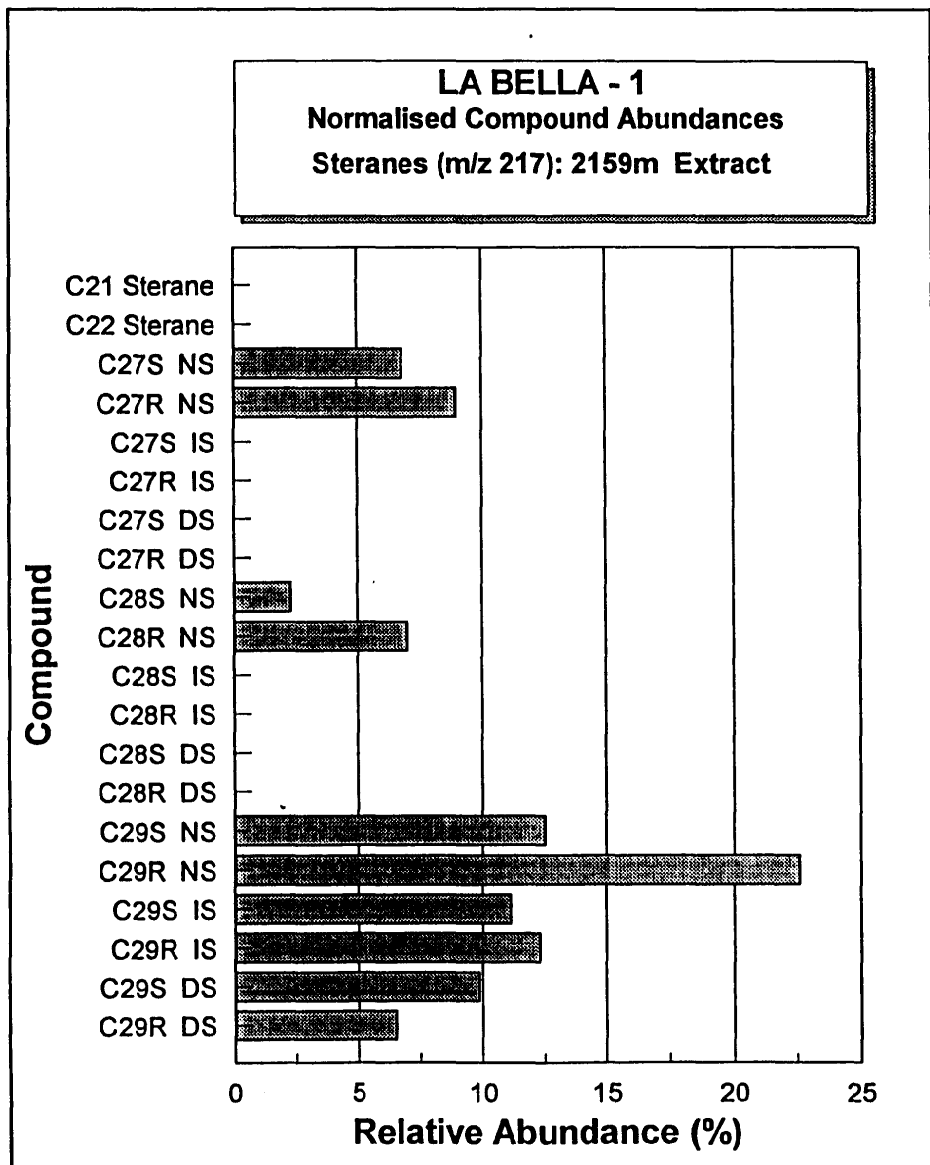
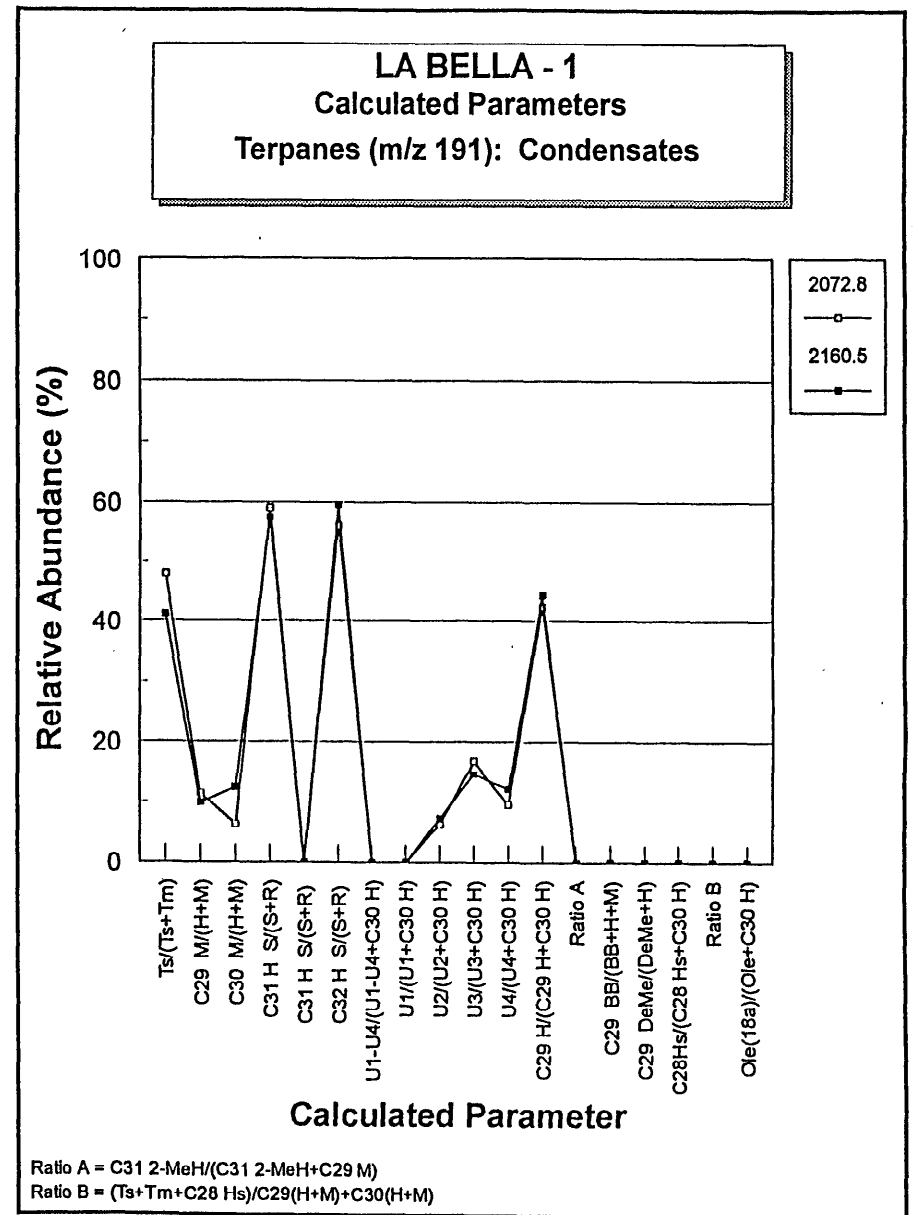
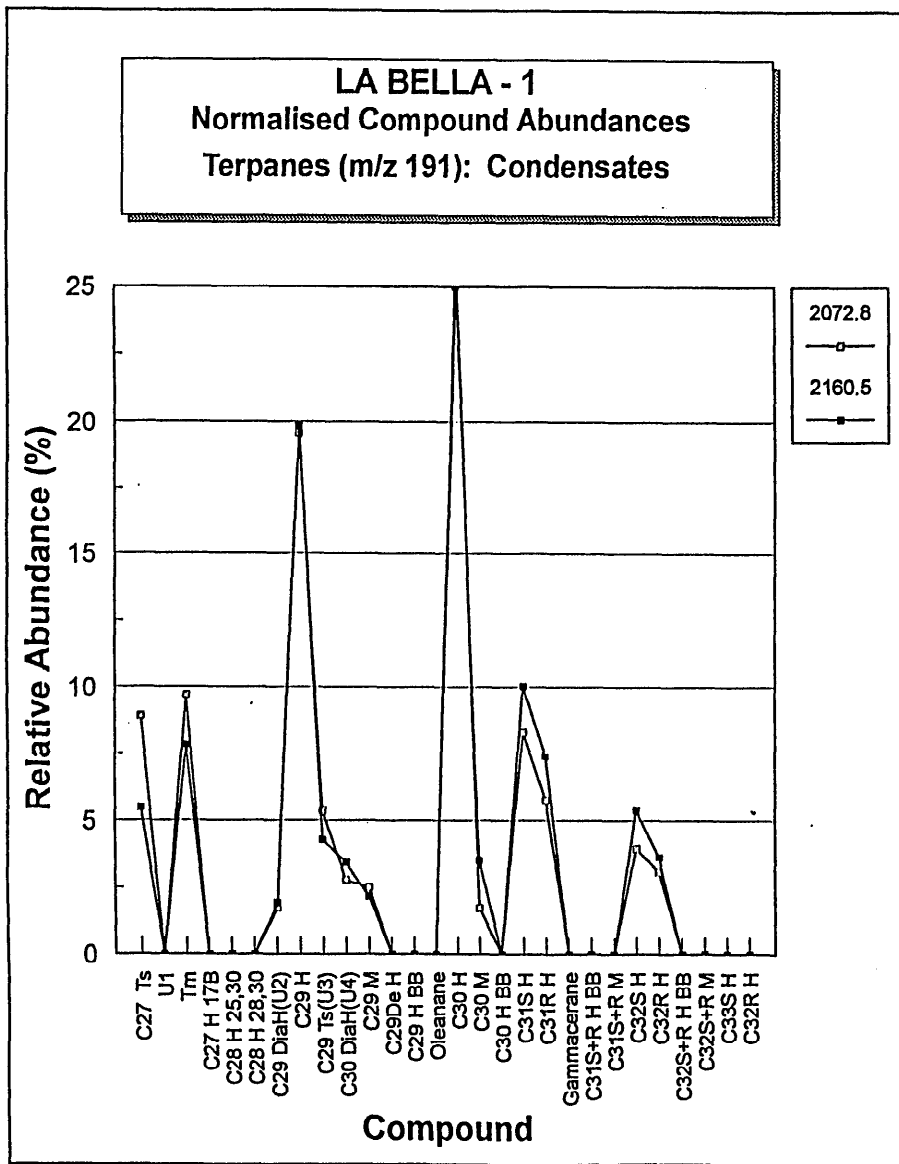


FIGURE 40b



LABL 1 / PE900368 / P206.

FIGURE 41a

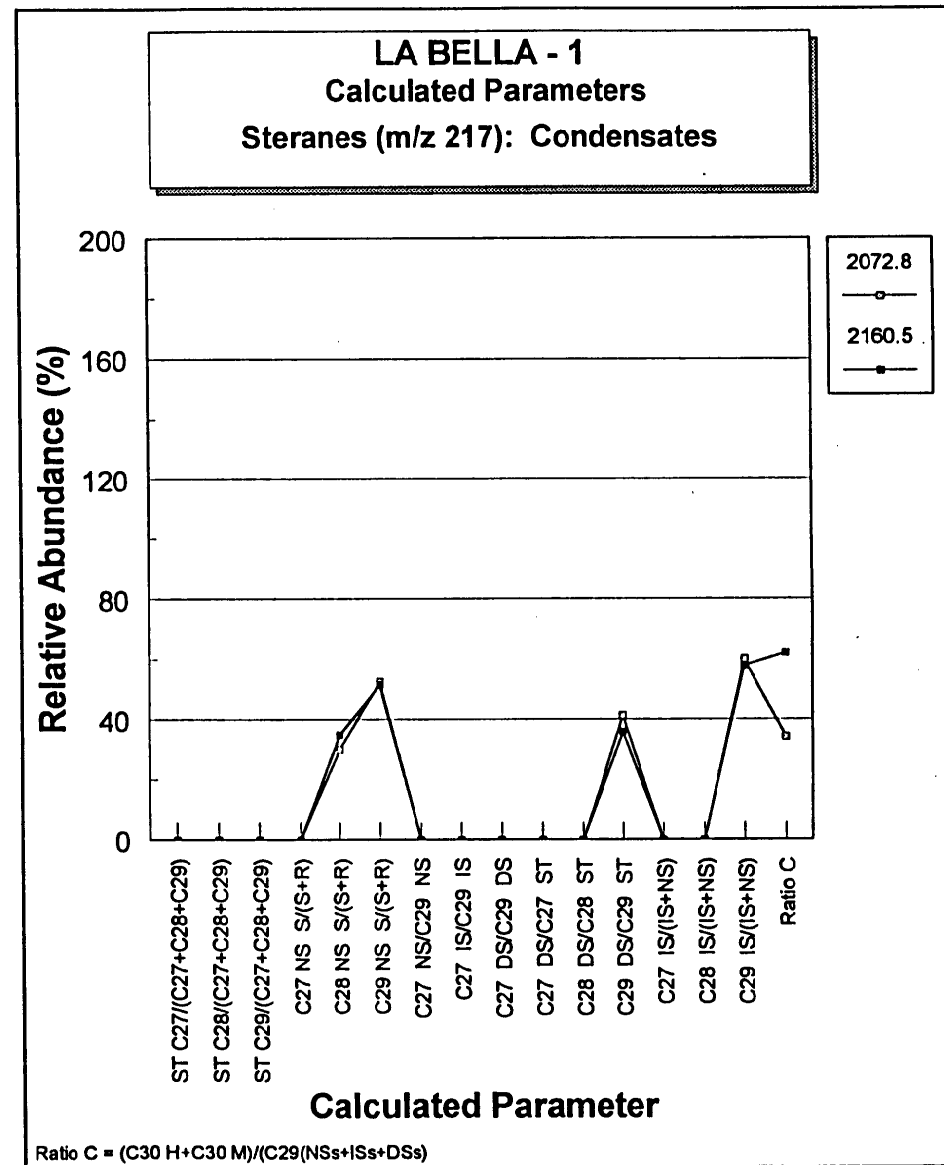
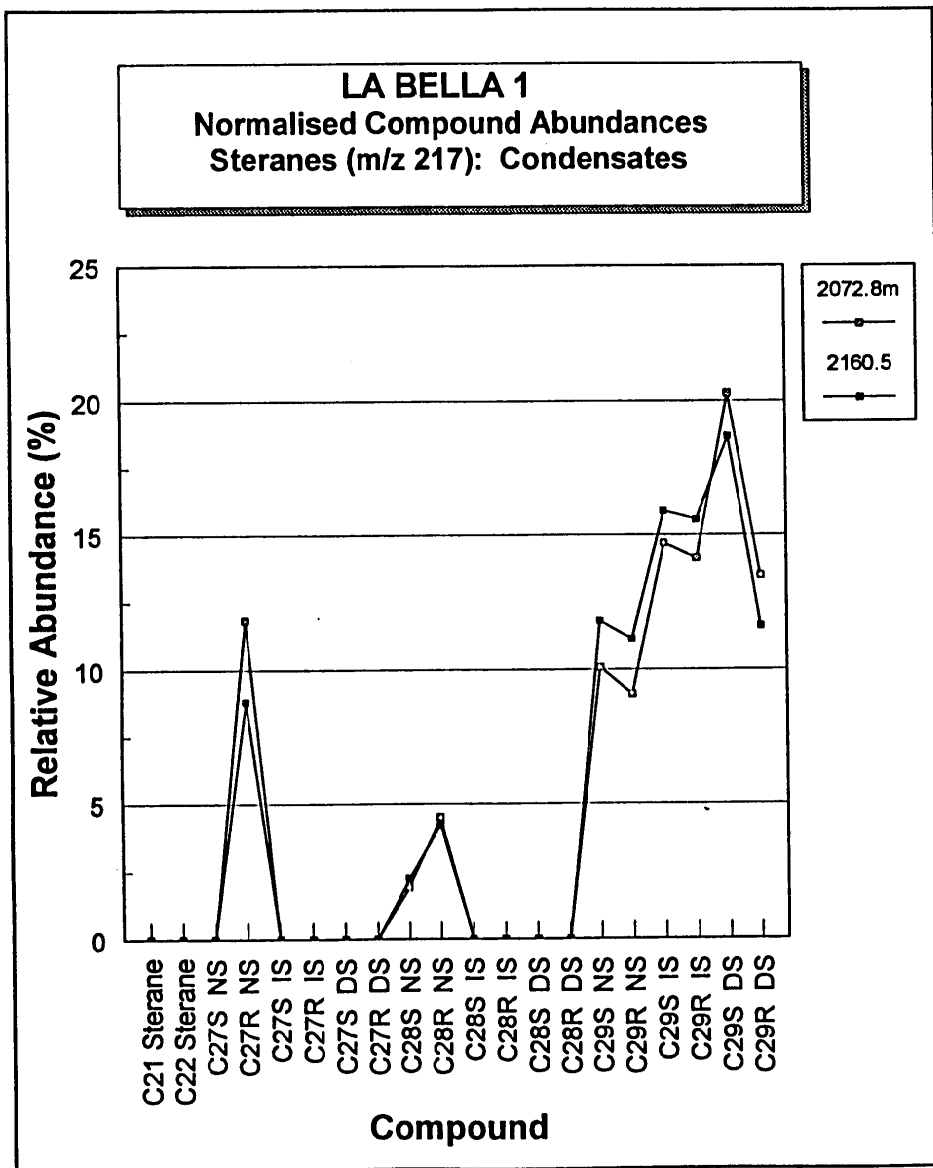


FIGURE 41b

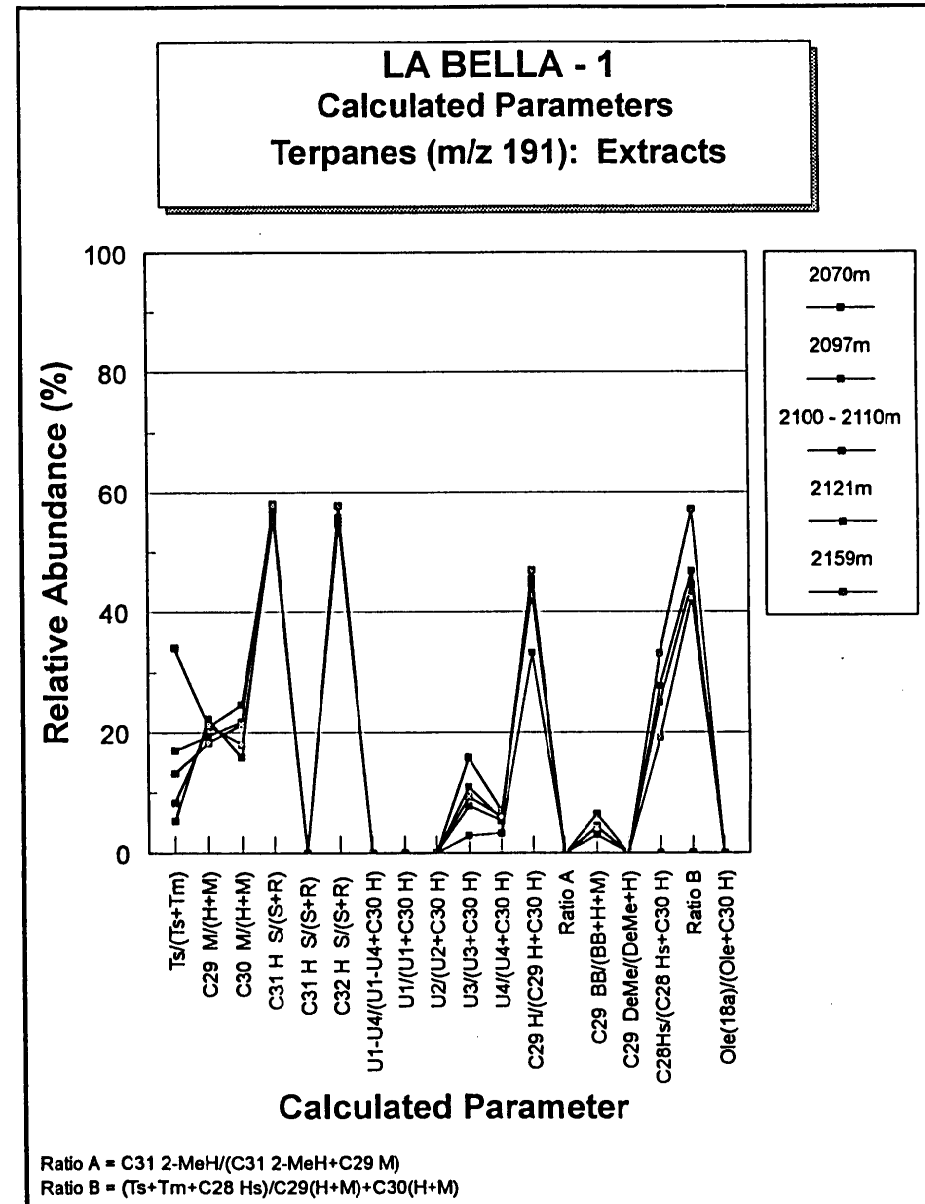
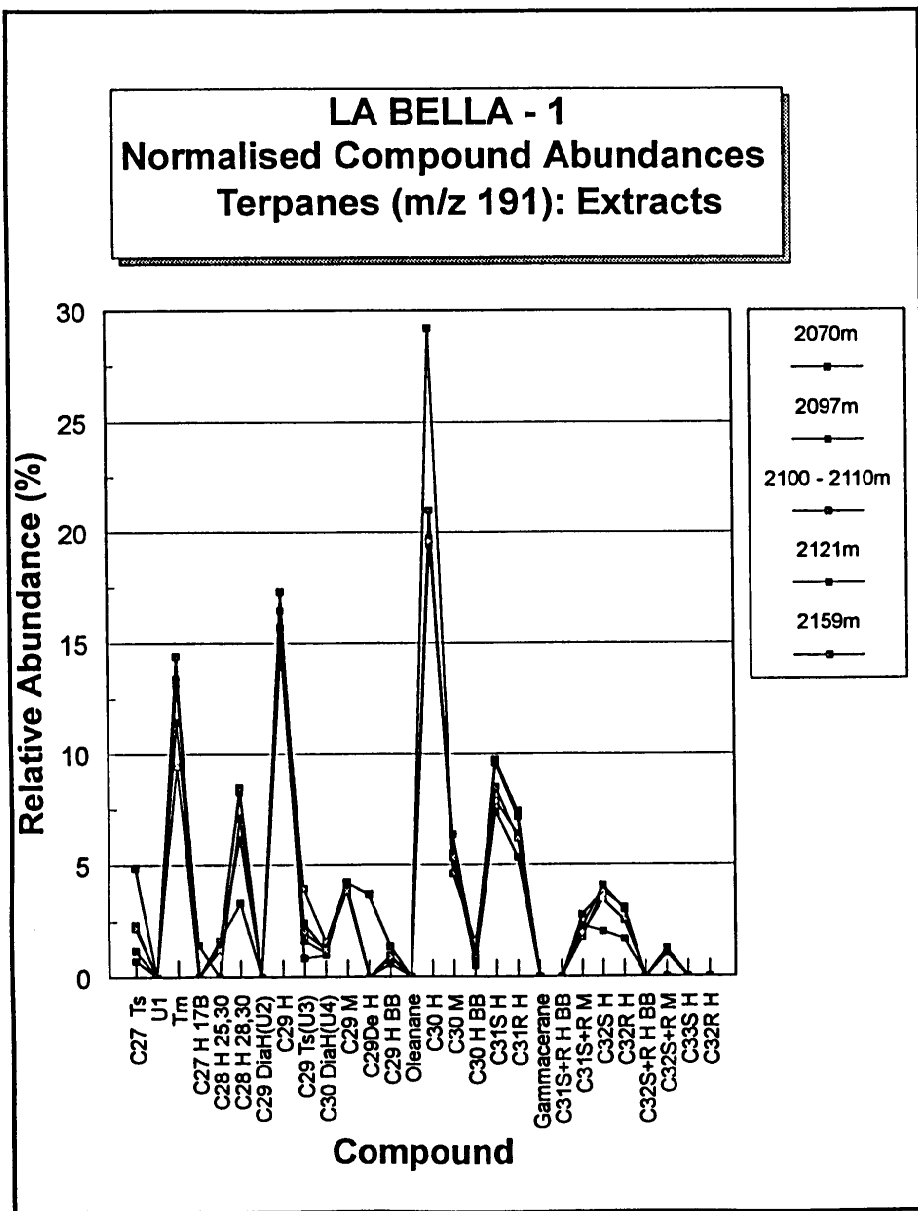


FIGURE 42a

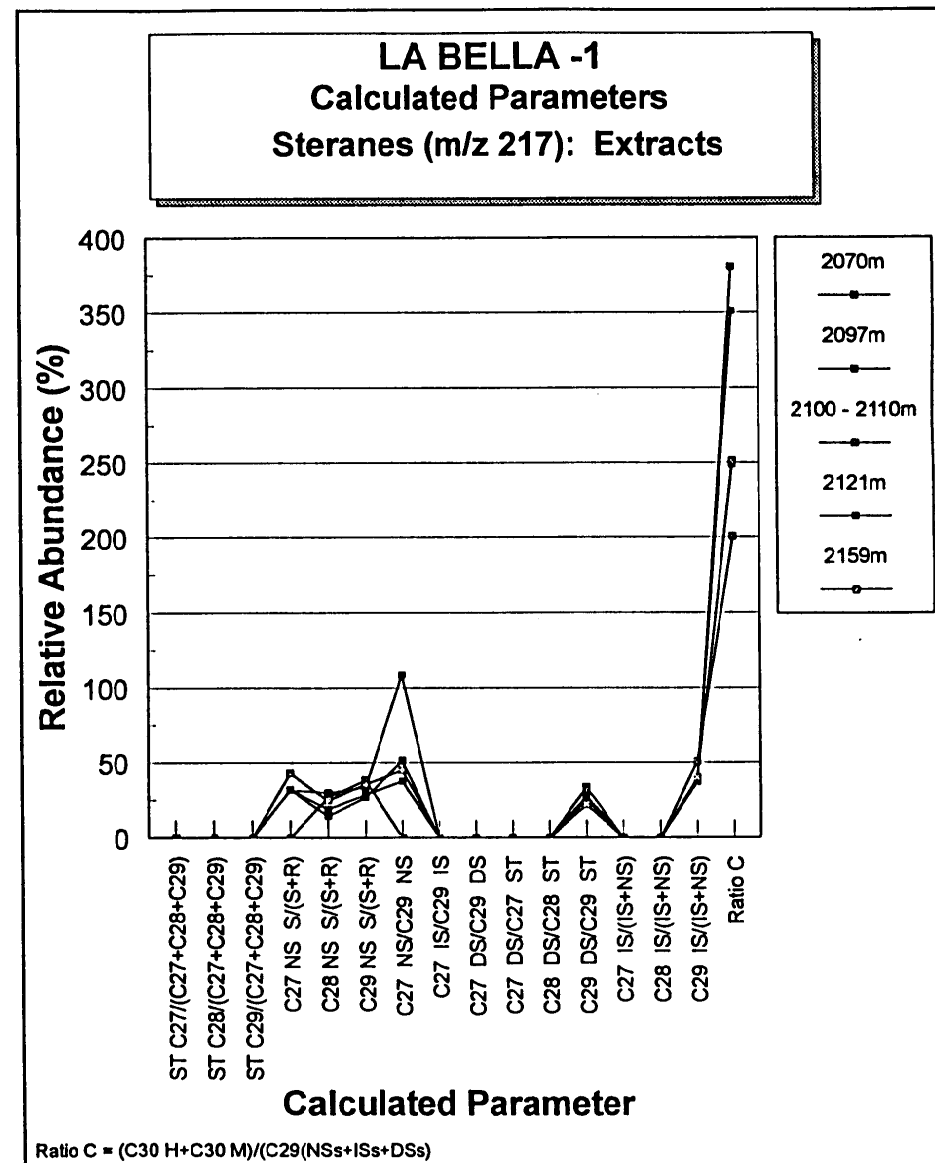
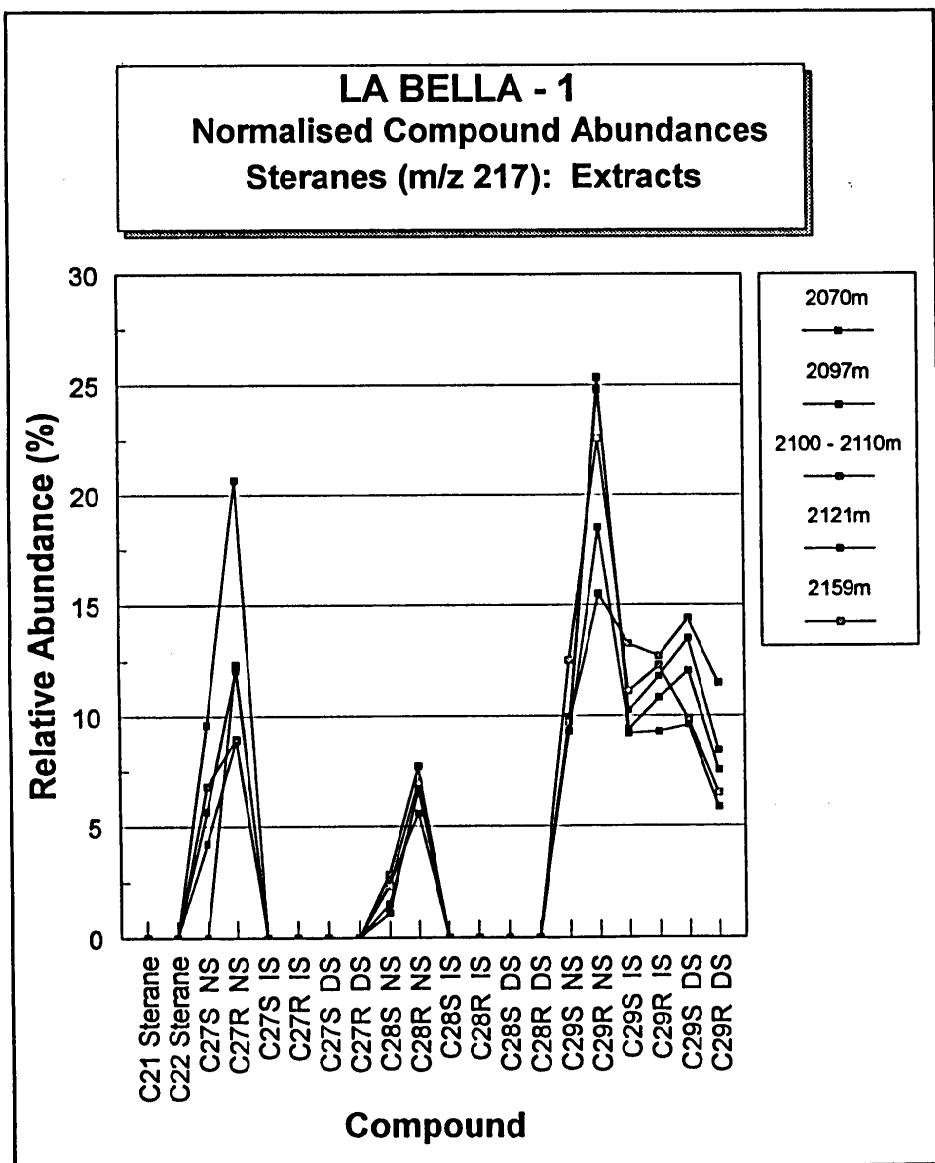
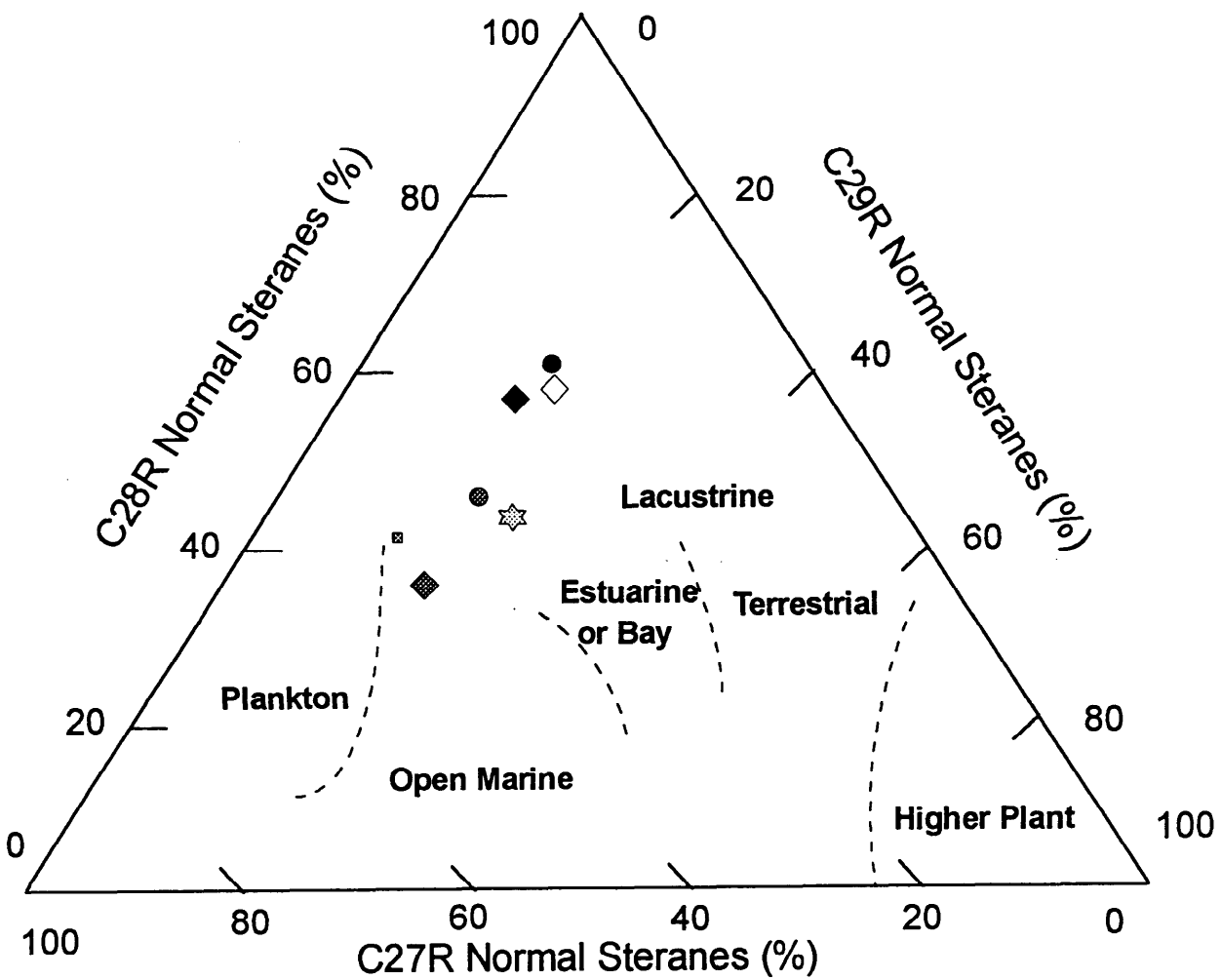


FIGURE 42b

LA BELLA - 1

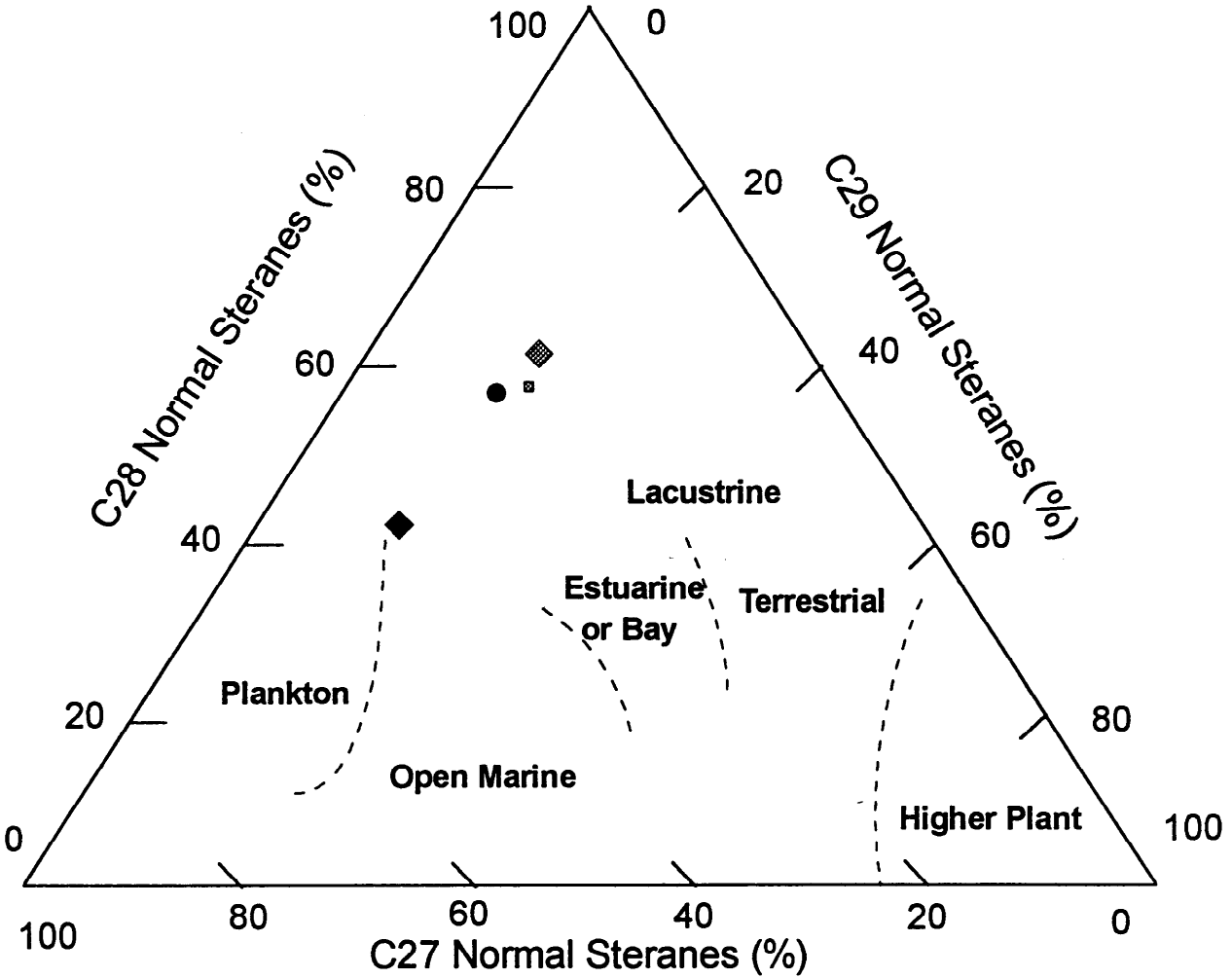
Facies Interpretation based on Sterane Abundances (R Isomers Only)



2070m	2097.7m	2100-2110m	2121m	2159m	2072.8	2160.5
Extract	Extract	Extract	Extract	Extract	Cond	Cond
◆	●	☆	■	◇	◆	●

Figure 43a

LA BELLA - 1
Facies Interpretation based on
Sterane Abundances (S+R Isomers)



2070m	2097.7m	2121m	2159m
Extract	Extract	Extract	Extract
●	◈	◆	◻

Figure 43b

Figure 44a

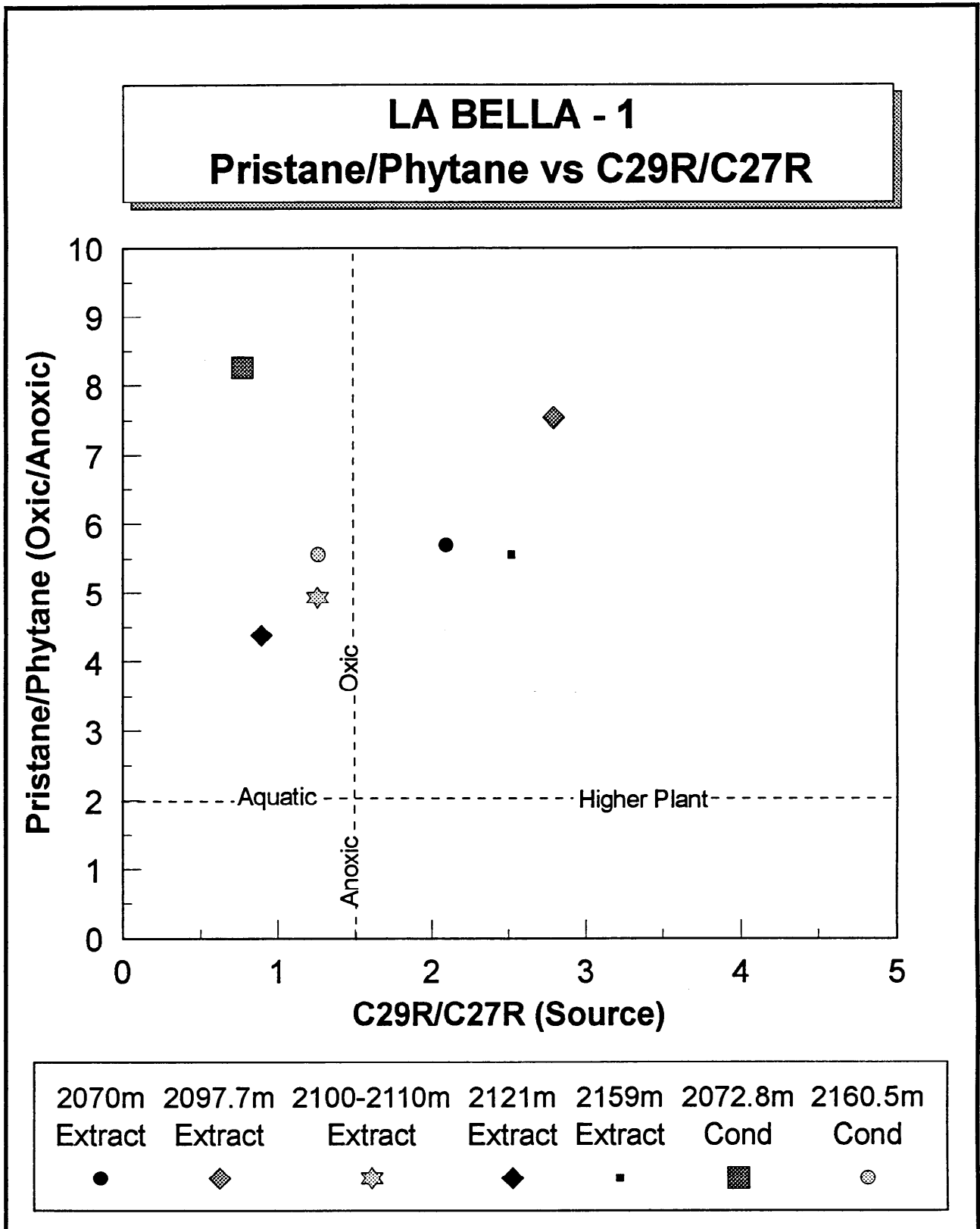
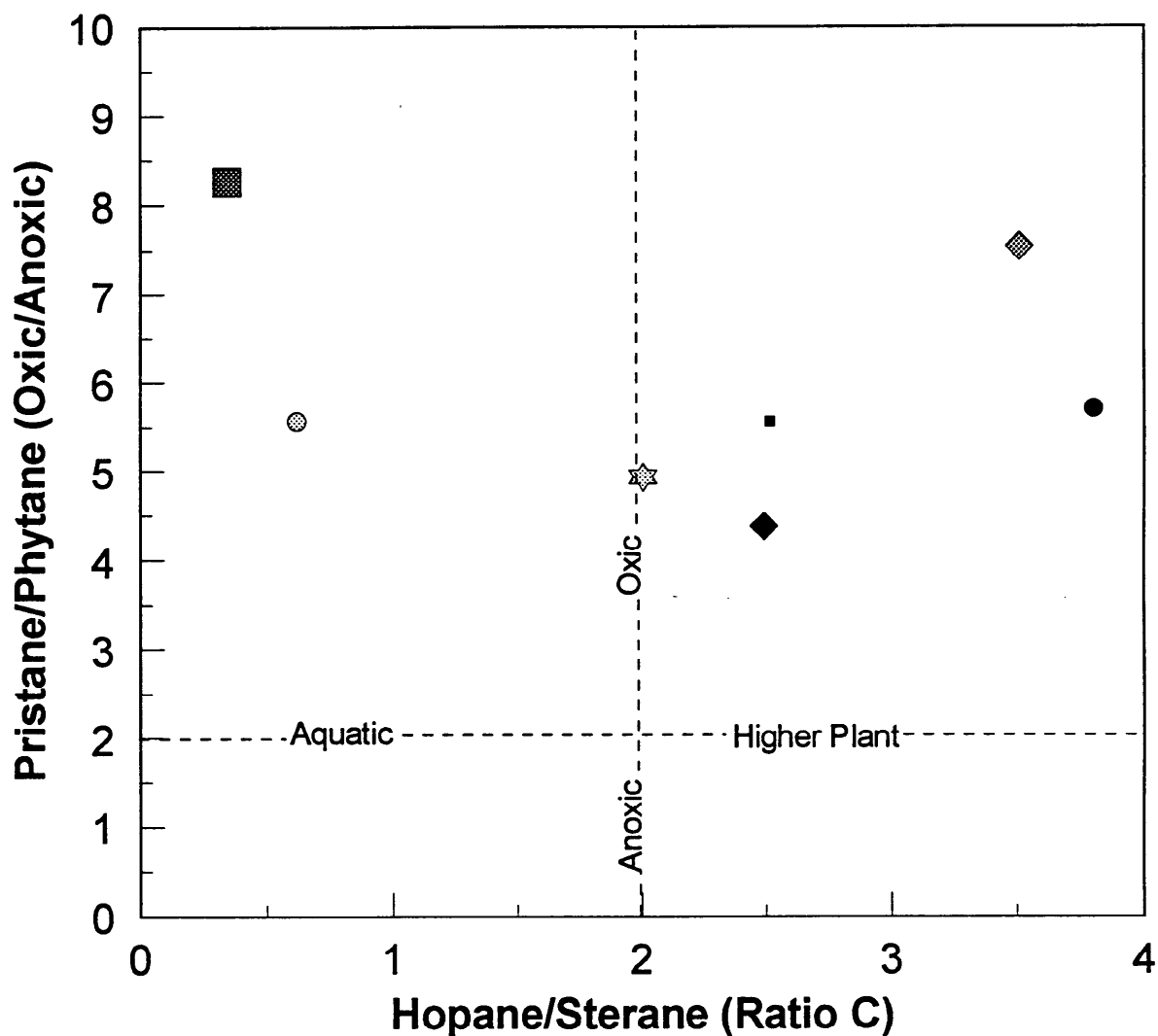


Figure 44b

LA BELLA - 1

Pristane/Phytane vs Hopane/Sterane Ratio



2070m 2097.7m 2100-2110m 2121m 2159m 2072.8m 2160.5m
 Extract Extract Extract Extract Extract Cond Cond

● ◆ ☆ ◆ ■ ■ ●

Figure 45

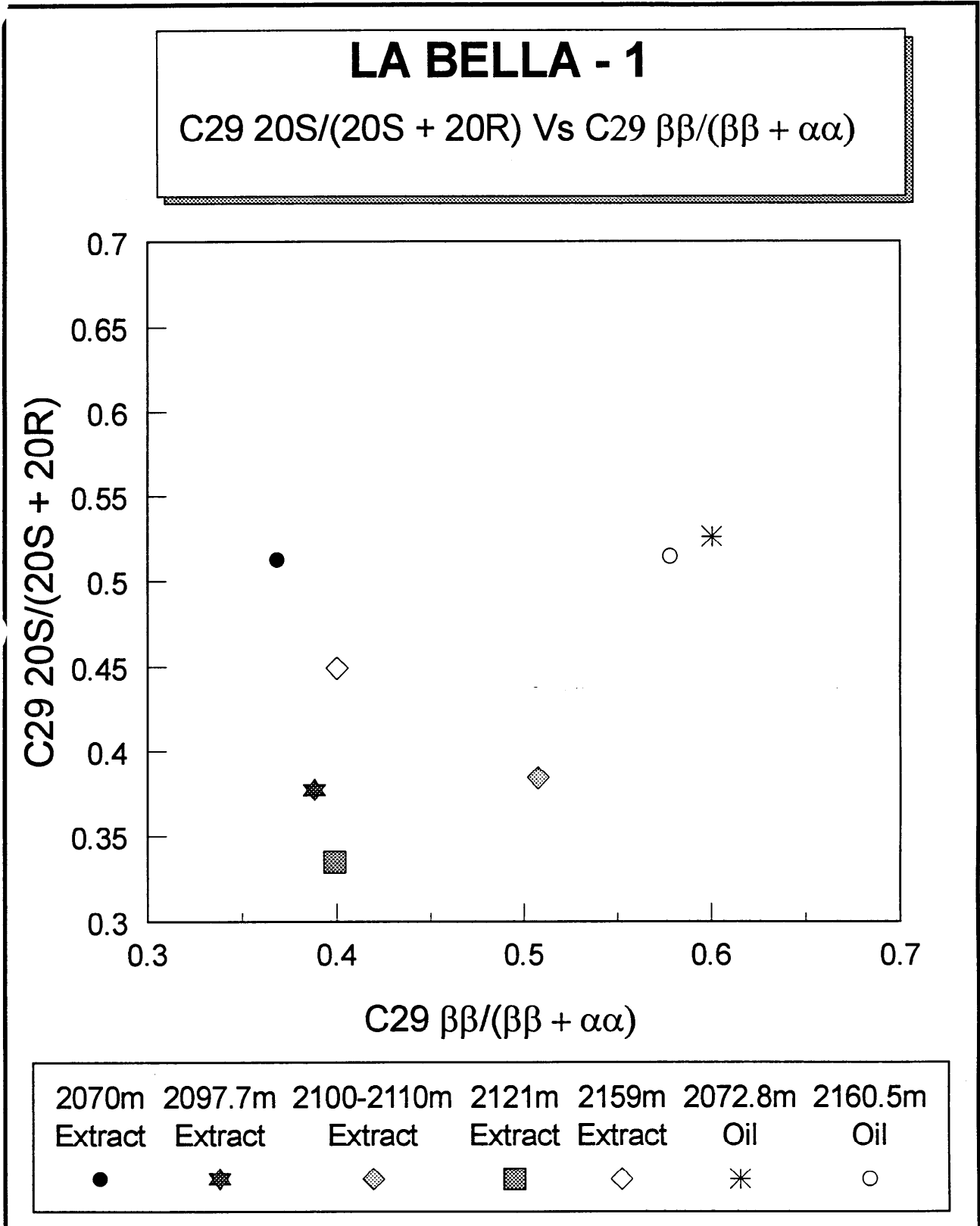


TABLE 19

DI & TRI NUCLEAR AROMATIC GC/MS DATA - OILS

DESCRIPTION : RFT SAMPLE

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1 = 2072.80

DEPTH 2 = 2072.80

A. DETAILED COMPOUND ANALYSIS

COMPOUND -----	ION ---	RELATIVE AMOUNT -----
1,5-Dimethylnaphthalene	156	302133.0
1,6-Dimethylnaphthalene	156	1339397.0
1,8-Dimethylnaphthalene	156	-
2,6-Dimethylnaphthalene	156	1583932.0
2,7-Dimethylnaphthalene	156	-
1,4+2,3-Dimethylnaphthalene	156	797040.0
1,2,5-Trimethylnaphthalene	170	846495.0
1,2,7-Trimethylnaphthalene	170	-
1,3,6-Trimethylnaphthalene	170	568754.0
1,3,7-Trimethylnaphthalene	170	454682.0
2,3,6-Trimethylnaphthalene	170	370439.0
1,3,5+1,4,6-Trimethylnaphthalene	170	488349.0
Phenanthrene	178	720813.0
1-Methylphenanthrene	192	112514.0
2-Methylphenanthrene	192	167823.0
3-Methylphenanthrene	192	148815.0
9-Methylphenanthrene	192	146469.0
1,7-Dimethylphenanthrene	206	51699.0
Compound X (1,3 + 3,9 + 2,10 + 3,10-DMP)	206	98442.0
Retene	219	33205.0
Cadalene	198	-
Eudalene	184	-

B. CALCULATED DATA

PARAMETER -----	ION ---	VALUE -----
DNR-1 = (2,6-DMN + 2,7-DMN) / 1,5-DMN	156	-
DNR-2 = 2,7-DMN / 1,8-DMN	156	-
DNR-5 = 1,6-DMN / 1,8-DMN	156	-
DNR-6 = ((2,6-DMN + 2,7-DMN) / 1,4+2,3-DMN)*0.91	156	-
TNR-1 = (2,3,6-TMN / 1,3,5+1,4,6-TMN)*0.82	170	0.62
TNR-5 = (1,2,5-TMN / 1,3,6-TMN)*0.75	170	1.12
TNR-6 = 1,2,7-TMN / 1,3,7-TMN	170	-
MPR-1 = (2-MP + 3-MP) / 1-MP	192	2.81
MPI-1 = (1.5 x (2-MP + 3-MP)) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.64
MPI-2 = (3 x 2-MP) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.68
Rc(a) = (0.6 x MPI-1) + 0.4	na	0.78
Rc(b) = (-0.6 x MPI-1) + 2.3	na	1.92
1,7-Dimethylphenanthrene / Compound X	206	0.53
Retene / 9-Methylphenanthrene	192,219	0.23
1-Methylphenanthrene / 9-Methylphenanthrene	192	0.77

Notes : DMN = Dimethylnaphthalene TMN = Trimethylnaphthalene - = no data
 MP = Methylphenanthrene Ph = Phenanthrene na = not applicable

TABLE 20

DI & TRI NUCLEAR AROMATIC GC/MS DATA - OILS

DESCRIPTION : RFT SAMPLE
 WELL = LA BELLA-1 DEPTH UNIT = Metres
 COUNTRY = Australia DATE OF JOB = Oct 93
 BASIN = Otway

DEPTH 1 = 2160.50

DEPTH 2 = 2160.50

A. DETAILED COMPOUND ANALYSIS

COMPOUND	ION	RELATIVE AMOUNT
1,5-Dimethylnaphthalene	156	426542.0
1,6-Dimethylnaphthalene	156	1918194.0
1,8-Dimethylnaphthalene	156	-
2,6-Dimethylnaphthalene	156	2637244.0
2,7-Dimethylnaphthalene	156	-
1,4+2,3-Dimethylnaphthalene	156	947912.0
1,2,5-Trimethylnaphthalene	170	991316.0
1,2,7-Trimethylnaphthalene	170	-
1,3,6-Trimethylnaphthalene	170	801792.0
1,3,7-Trimethylnaphthalene	170	658611.0
2,3,6-Trimethylnaphthalene	170	521846.0
1,3,5+1,4,6-Trimethylnaphthalene	170	672860.0
Phenanthrene	178	612065.0
1-Methylphenanthrene	192	188200.0
2-Methylphenanthrene	192	274914.0
3-Methylphenanthrene	192	227624.0
9-Methylphenanthrene	192	215570.0
1,7-Dimethylphenanthrene	206	150174.0
Compound X (1,3 + 3,9 + 2,10 + 3,10-DMP)	206	215928.0
Retene	219	57243.0
Cadalene	198	-
Eudalene	184	-

B. CALCULATED DATA

PARAMETER	ION	VALUE
DNR-1 = (2,6-DMN + 2,7-DMN) / 1,5-DMN	156	-
DNR-2 = 2,7-DMN / 1,8-DMN	156	-
DNR-5 = 1,6-DMN / 1,8-DMN	156	-
DNR-6 = ((2,6-DMN + 2,7-DMN) / 1,4+2,3-DMN)*0.91	156	-
TNR-1 = (2,3,6-TMN / 1,3,5+1,4,6-TMN)*0.82	170	0.64
TNR-5 = (1,2,5-TMN / 1,3,6-TMN)*0.75	170	0.93
TNR-6 = 1,2,7-TMN / 1,3,7-TMN	170	-
MPR-1 = (2-MP + 3-MP) / 1-MP	192	2.67
MPI-1 = (1.5 x (2-MP + 3-MP)) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.93
MPI-2 = (3 x 2-MP) / (0.667*Ph + 1-MP + 9-MP)	178,192	1.02
Rc(a) = (0.6 x MPI-1) + 0.4	na	0.96
Rc(b) = (-0.6 x MPI-1) + 2.3	na	1.74
1,7-Dimethylphenanthrene / Compound X	206	0.70
Retene / 9-Methylphenanthrene	192,219	0.27
1-Methylphenanthrene / 9-Methylphenanthrene	192	0.87

Notes : DMN = Dimethylnaphthalene TMN = Trimethylnaphthalene - = no data
 MP = Methylphenanthrene Ph = Phenanthrene na = not applicable

TABLE 21

DI & TRI NUCLEAR AROMATIC GC/MS DATA - SEDIMENTS

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1 = 2070.00

DEPTH 2 = 2070.00

A. DETAILED COMPOUND ANALYSIS

COMPOUND	ION	RELATIVE AMOUNT
1,5-Dimethylnaphthalene	156	45478.0
1,6-Dimethylnaphthalene	156	196868.0
1,8-Dimethylnaphthalene	156	-
2,6-Dimethylnaphthalene	156	212318.0
2,7-Dimethylnaphthalene	156	-
1,4+2,3-Dimethylnaphthalene	156	143772.0
1,2,5-Trimethylnaphthalene	170	202302.0
1,2,7-Trimethylnaphthalene	170	-
1,3,6-Trimethylnaphthalene	170	73654.0
1,3,7-Trimethylnaphthalene	170	46669.0
2,3,6-Trimethylnaphthalene	170	62410.0
1,3,5+1,4,6-Trimethylnaphthalene	170	61120.0
Phenanthrene	178	1939544.0
1-Methylphenanthrene	192	267460.0
2-Methylphenanthrene	192	424921.0
3-Methylphenanthrene	192	286048.0
9-Methylphenanthrene	192	334884.0
1,7-Dimethylphenanthrene	206	94722.0
Compound X (1,3 + 3,9 + 2,10 + 3,10-DMP)	206	138490.0
Retene	219	44049.0
Cadalene	198	-
Eudalene	184	-

B. CALCULATED DATA

PARAMETER	ION	VALUE
DNR-1 = (2,6-DMN + 2,7-DMN) / 1,5-DMN	156	-
DNR-2 = 2,7-DMN / 1,8-DMN	156	-
DNR-5 = 1,6-DMN / 1,8-DMN	156	-
DNR-6 = ((2,6-DMN + 2,7-DMN) / 1,4+2,3-DMN)*0.91	156	-
TNR-1 = (2,3,6-TMN / 1,3,5+1,4,6-TMN)*0.82	170	0.84
TNR-5 = (1,2,5-TMN / 1,3,6-TMN)*0.75	170	2.06
TNR-6 = 1,2,7-TMN / 1,3,7-TMN	170	-
MPR-1 = (2-MP + 3-MP) / 1-MP	192	2.66
MPI-1 = (1.5 x (2-MP + 3-MP)) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.56
MPI-2 = (3 x 2-MP) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.67
Rc(a) = (0.6 x MPI-1) + 0.4	na	0.74
Rc(b) = (-0.6 x MPI-1) + 2.3	na	1.96
1,7-Dimethylphenanthrene / Compound X	206	0.68
Retene / 9-Methylphenanthrene	192,219	0.13
1-Methylphenanthrene / 9-Methylphenanthrene	192	0.80

Notes : DMN = Dimethylnaphthalene TMN = Trimethylnaphthalene - = no data
 MP = Methylphenanthrene Ph = Phenanthrene na = not applicable

TABLE 22

DI & TRI NUCLEAR AROMATIC GC/MS DATA - SEDIMENTS

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1 = 2097.70

DEPTH 2 = 2097.70

A. DETAILED COMPOUND ANALYSIS

COMPOUND -----	ION ---	RELATIVE AMOUNT -----
1,5-Dimethylnaphthalene	156	54693.0
1,6-Dimethylnaphthalene	156	193238.0
1,8-Dimethylnaphthalene	156	-
2,6-Dimethylnaphthalene	156	199834.0
2,7-Dimethylnaphthalene	156	-
1,4+2,3-Dimethylnaphthalene	156	147645.0
1,2,5-Trimethylnaphthalene	170	286469.0
1,2,7-Trimethylnaphthalene	170	-
1,3,6-Trimethylnaphthalene	170	59786.0
1,3,7-Trimethylnaphthalene	170	34132.0
2,3,6-Trimethylnaphthalene	170	43655.0
1,3,5+1,4,6-Trimethylnaphthalene	170	55547.0
Phenanthrene	178	2812541.0
1-Methylphenanthrene	192	314650.0
2-Methylphenanthrene	192	513940.0
3-Methylphenanthrene	192	365237.0
9-Methylphenanthrene	192	373188.0
1,7-Dimethylphenanthrene	206	92128.0
Compound X (1,3 + 3,9 + 2,10 + 3,10-DMP)	206	137357.0
Retene	219	48435.0
Cadalene	198	-
Eudalene	184	-

B. CALCULATED DATA

PARAMETER -----	ION ---	VALUE -----
DNR-1 = (2,6-DMN + 2,7-DMN) / 1,5-DMN	156	-
DNR-2 = 2,7-DMN / 1,8-DMN	156	-
DNR-5 = 1,6-DMN / 1,8-DMN	156	-
DNR-6 = ((2,6-DMN + 2,7-DMN) / 1,4+2,3-DMN)*0.91	156	-
TNR-1 = (2,3,6-TMN / 1,3,5+1,4,6-TMN)*0.82	170	0.64
TNR-5 = (1,2,5-TMN / 1,3,6-TMN)*0.75	170	3.59
TNR-6 = 1,2,7-TMN / 1,3,7-TMN	170	-
MPR-1 = (2-MP + 3-MP) / 1-MP	192	2.79
MPI-1 = (1.5 x (2-MP + 3-MP)) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.51
MPI-2 = (3 x 2-MP) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.60
Rc(a) = (0.6 x MPI-1) + 0.4	na	0.71
Rc(b) = (-0.6 x MPI-1) + 2.3	na	1.99
1,7-Dimethylphenanthrene / Compound X	206	0.67
Retene / 9-Methylphenanthrene	192,219	0.13
1-Methylphenanthrene / 9-Methylphenanthrene	192	0.84

Notes : DMN = Dimethylnaphthalene TMN = Trimethylnaphthalene - = no data
 MP = Methylphenanthrene Ph = Phenanthrene na = not applicable

TABLE 23

DI & TRI NUCLEAR AROMATIC GC/MS DATA - SEDIMENTS

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1 = 2100.00

DEPTH 2 = 2110.00

A. DETAILED COMPOUND ANALYSIS

COMPOUND -----	ION ---	RELATIVE AMOUNT -----
1,5-Dimethylnaphthalene	156	186383.0
1,6-Dimethylnaphthalene	156	694738.0
1,8-Dimethylnaphthalene	156	-
2,6-Dimethylnaphthalene	156	741372.0
2,7-Dimethylnaphthalene	156	-
1,4+2,3-Dimethylnaphthalene	156	499720.0
1,2,5-Trimethylnaphthalene	170	803246.0
1,2,7-Trimethylnaphthalene	170	-
1,3,6-Trimethylnaphthalene	170	206484.0
1,3,7-Trimethylnaphthalene	170	131183.0
2,3,6-Trimethylnaphthalene	170	152578.0
1,3,5+1,4,6-Trimethylnaphthalene	170	187535.0
Phenanthrene	178	6977850.0
1-Methylphenanthrene	192	797780.0
2-Methylphenanthrene	192	1286611.0
3-Methylphenanthrene	192	939844.0
9-Methylphenanthrene	192	981828.0
1,7-Dimethylphenanthrene	206	232311.0
Compound X (1,3 + 3,9 + 2,10 + 3,10-DMP)	206	351441.0
Retene	219	114034.0
Cadalene	198	-
Eudalene	184	-

B. CALCULATED DATA

PARAMETER -----	ION ---	VALUE -----
DNR-1 = (2,6-DMN + 2,7-DMN) / 1,5-DMN	156	-
DNR-2 = 2,7-DMN / 1,8-DMN	156	-
DNR-5 = 1,6-DMN / 1,8-DMN	156	-
DNR-6 = ((2,6-DMN + 2,7-DMN) / 1,4+2,3-DMN)*0.91	156	-
TNR-1 = (2,3,6-TMN / 1,3,5+1,4,6-TMN)*0.82	170	0.67
TNR-5 = (1,2,5-TMN / 1,3,6-TMN)*0.75	170	2.92
TNR-6 = 1,2,7-TMN / 1,3,7-TMN	170	-
MPR-1 = (2-MP + 3-MP) / 1-MP	192	2.79
MPI-1 = (1.5 x (2-MP + 3-MP)) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.52
MPI-2 = (3 x 2-MP) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.60
Rc(a) = (0.6 x MPI-1) + 0.4	na	0.71
Rc(b) = (-0.6 x MPI-1) + 2.3	na	1.99
1,7-Dimethylphenanthrene / Compound X	206	0.66
Retene / 9-Methylphenanthrene	192,219	0.12
1-Methylphenanthrene / 9-Methylphenanthrene	192	0.81

Notes : DMN = Dimethylnaphthalene TMN = Trimethylnaphthalene - = no data
 MP = Methylphenanthrene Ph = Phenanthrene na = not applicable

TABLE 24

DI & TRI NUCLEAR AROMATIC GC/MS DATA - SEDIMENTS

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1 = 2121.00

DEPTH 2 = 2121.00

A. DETAILED COMPOUND ANALYSIS

COMPOUND	ION	RELATIVE AMOUNT
1,5-Dimethylnaphthalene	156	31870.0
1,6-Dimethylnaphthalene	156	144307.0
1,8-Dimethylnaphthalene	156	-
2,6-Dimethylnaphthalene	156	208309.0
2,7-Dimethylnaphthalene	156	-
1,4+2,3-Dimethylnaphthalene	156	85659.0
1,2,5-Trimethylnaphthalene	170	172092.0
1,2,7-Trimethylnaphthalene	170	-
1,3,6-Trimethylnaphthalene	170	57697.0
1,3,7-Trimethylnaphthalene	170	36897.0
2,3,6-Trimethylnaphthalene	170	43224.0
1,3,5+1,4,6-Trimethylnaphthalene	170	45758.0
Phenanthrene	178	1836398.0
1-Methylphenanthrene	192	294102.0
2-Methylphenanthrene	192	485813.0
3-Methylphenanthrene	192	320017.0
9-Methylphenanthrene	192	331511.0
1,7-Dimethylphenanthrene	206	107813.0
Compound X (1,3 + 3,9 + 2,10 + 3,10-DMP)	206	157359.0
Retene	219	44941.0
Cadalene	198	-
Eudalene	184	-

B. CALCULATED DATA

PARAMETER	ION	VALUE
DNR-1 = (2,6-DMN + 2,7-DMN) / 1,5-DMN	156	-
DNR-2 = 2,7-DMN / 1,8-DMN	156	-
DNR-5 = 1,6-DMN / 1,8-DMN	156	-
DNR-6 = ((2,6-DMN + 2,7-DMN) / 1,4+2,3-DMN)*0.91	156	-
TNR-1 = (2,3,6-TMN / 1,3,5+1,4,6-TMN)*0.82	170	0.77
TNR-5 = (1,2,5-TMN / 1,3,6-TMN)*0.75	170	2.24
TNR-6 = 1,2,7-TMN / 1,3,7-TMN	170	-
MPR-1 = (2-MP + 3-MP) / 1-MP	192	2.74
MPI-1 = (1.5 x (2-MP + 3-MP)) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.65
MPI-2 = (3 x 2-MP) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.79
Rc(a) = (0.6 x MPI-1) + 0.4	na	0.79
Rc(b) = (-0.6 x MPI-1) + 2.3	na	1.91
1,7-Dimethylphenanthrene / Compound X	206	0.69
Retene / 9-Methylphenanthrene	192,219	0.14
1-Methylphenanthrene / 9-Methylphenanthrene	192	0.89

Notes : DMN = Dimethylnaphthalene TMN = Trimethylnaphthalene - = no data
 MP = Methylphenanthrene Ph = Phenanthrene na = not applicable

TABLE 25

DI & TRI NUCLEAR AROMATIC GC/MS DATA - SEDIMENTS

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DEPTH 1 = 2159.00

DEPTH 2 = 2159.00

A. DETAILED COMPOUND ANALYSIS

COMPOUND -----	ION ---	RELATIVE AMOUNT -----
1,5-Dimethylnaphthalene	156	65169.0
1,6-Dimethylnaphthalene	156	222579.0
1,8-Dimethylnaphthalene	156	-
2,6-Dimethylnaphthalene	156	214085.0
2,7-Dimethylnaphthalene	156	-
1,4+2,3-Dimethylnaphthalene	156	159479.0
1,2,5-Trimethylnaphthalene	170	382812.0
1,2,7-Trimethylnaphthalene	170	26325.0
1,3,6-Trimethylnaphthalene	170	74897.0
1,3,7-Trimethylnaphthalene	170	38606.0
2,3,6-Trimethylnaphthalene	170	56571.0
1,3,5+1,4,6-Trimethylnaphthalene	170	74529.0
Phenanthrene	178	2114964.0
1-Methylphenanthrene	192	374004.0
2-Methylphenanthrene	192	623551.0
3-Methylphenanthrene	192	396093.0
9-Methylphenanthrene	192	481887.0
1,7-Dimethylphenanthrene	206	175463.0
Compound X (1,3 + 3,9 + 2,10 + 3,10-DMP)	206	219856.0
Retene	219	71339.0
Cadalene	198	-
Eudalene	184	-

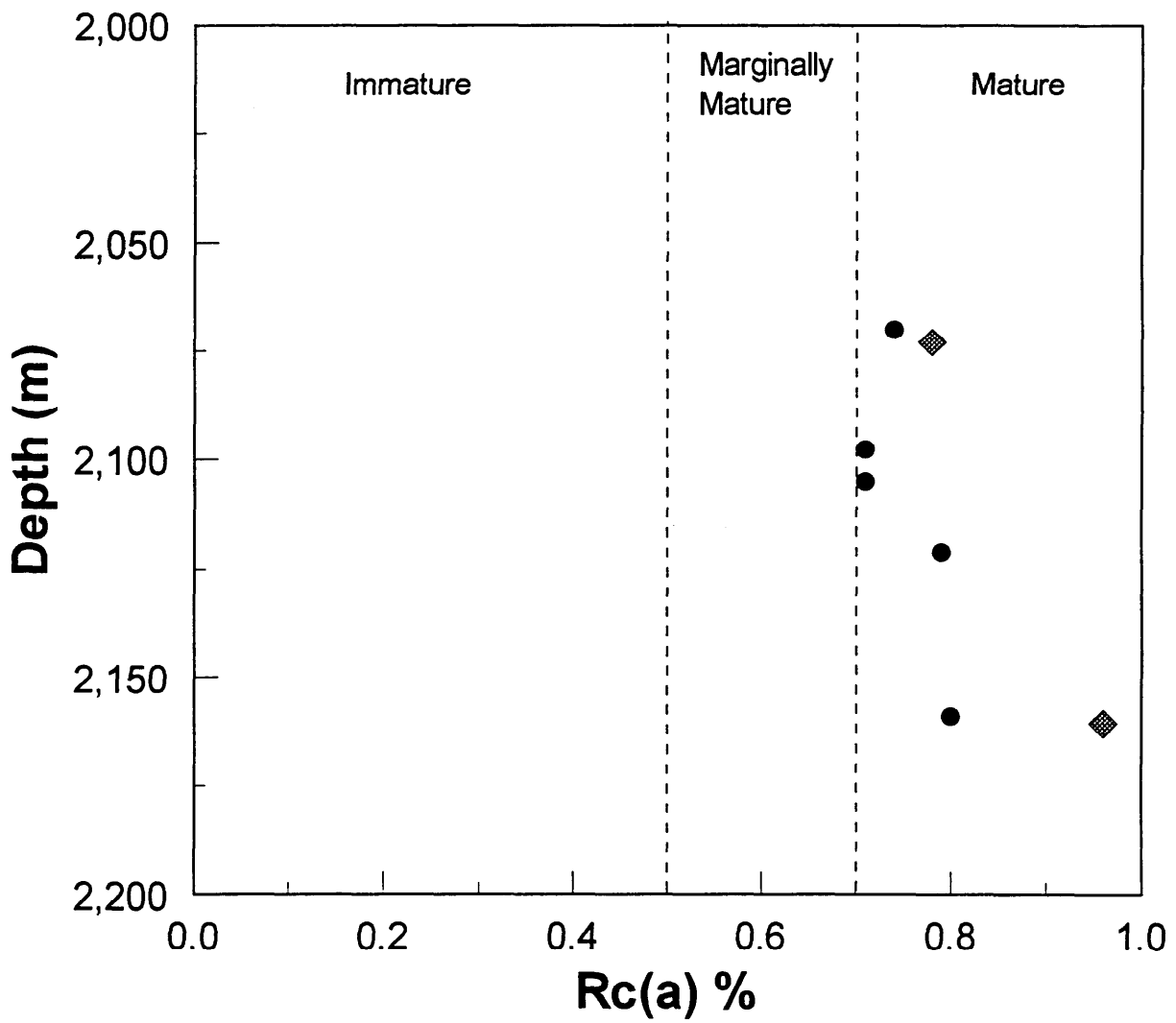
B. CALCULATED DATA

PARAMETER -----	ION ---	VALUE -----
DNR-1 = (2,6-DMN + 2,7-DMN) / 1,5-DMN	156	-
DNR-2 = 2,7-DMN / 1,8-DMN	156	-
DNR-5 = 1,6-DMN / 1,8-DMN	156	-
DNR-6 = ((2,6-DMN + 2,7-DMN) / 1,4+2,3-DMN)*0.91	156	-
TNR-1 = (2,3,6-TMN / 1,3,5+1,4,6-TMN)*0.82	170	0.62
TNR-5 = (1,2,5-TMN / 1,3,6-TMN)*0.75	170	3.83
TNR-6 = 1,2,7-TMN / 1,3,7-TMN	170	0.68
MPR-1 = (2-MP + 3-MP) / 1-MP	192	2.73
MPI-1 = (1.5 x (2-MP + 3-MP)) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.67
MPI-2 = (3 x 2-MP) / (0.667*Ph + 1-MP + 9-MP)	178,192	0.83
Rc(a) = (0.6 x MPI-1) + 0.4	na	0.80
Rc(b) = (-0.6 x MPI-1) + 2.3	na	1.90
1,7-Dimethylphenanthrene / Compound X	206	0.80
Retene / 9-Methylphenanthrene	192,219	0.15
1-Methylphenanthrene / 9-Methylphenanthrene	192	0.78

Notes : DMN = Dimethylnaphthalene TMN = Trimethylnaphthalene - = no data
 MP = Methylphenanthrene Ph = Phenanthrene na = not applicable

Figure 46a

LA BELLA - 1 MPI-1-derived Rc(a) vs Depth

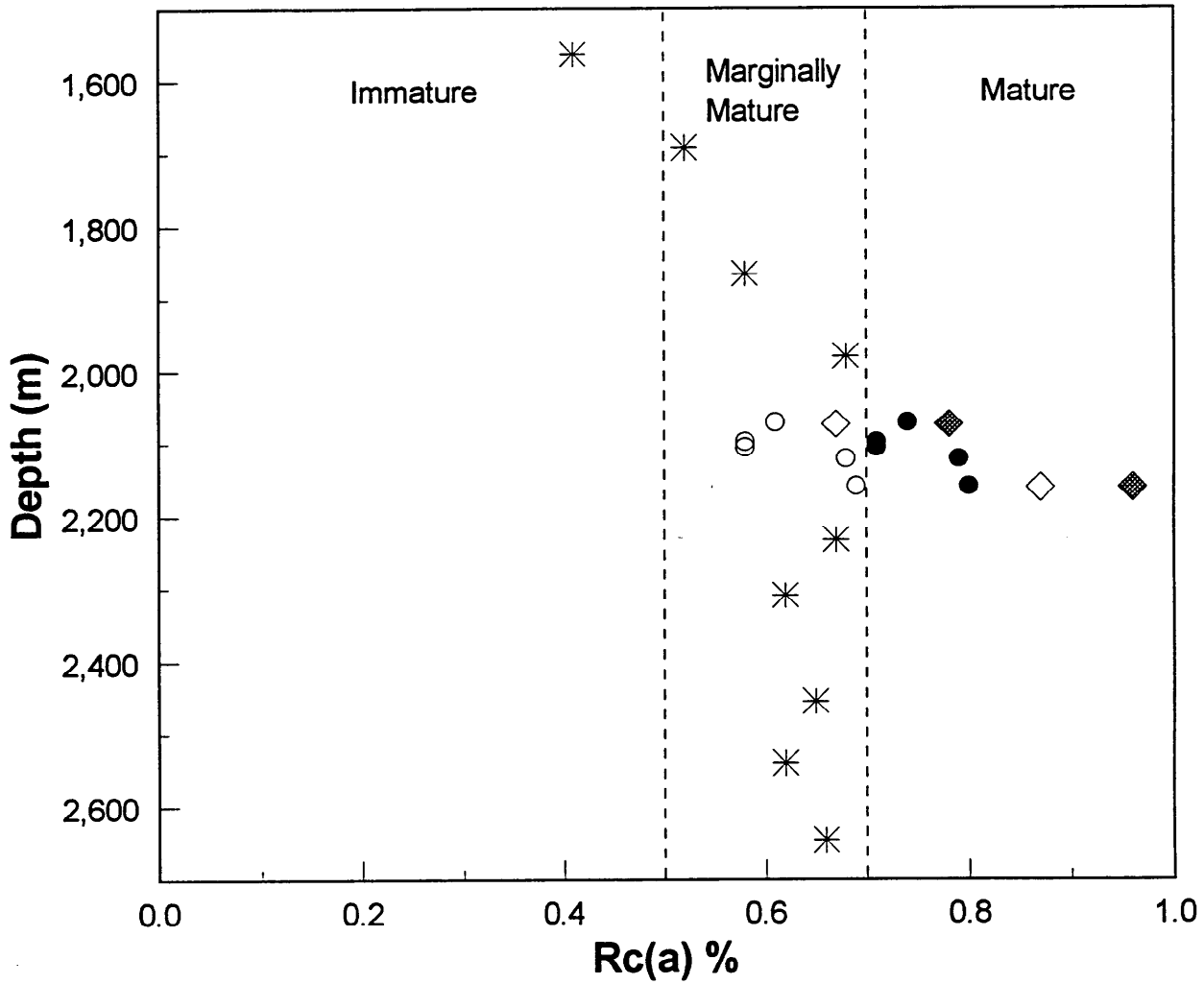


Extract Condensate



Figure 46b

LA BELLA - 1 MPI-1-derived Rc(a) vs Depth



- Extract (Radke et al, 1982)
- Extract (Boreham et al, 1988)
- * VR Data
- ◆ Condensate (Radke et al, 1982)
- ◇ Condensate (Boreham et al, 1988)

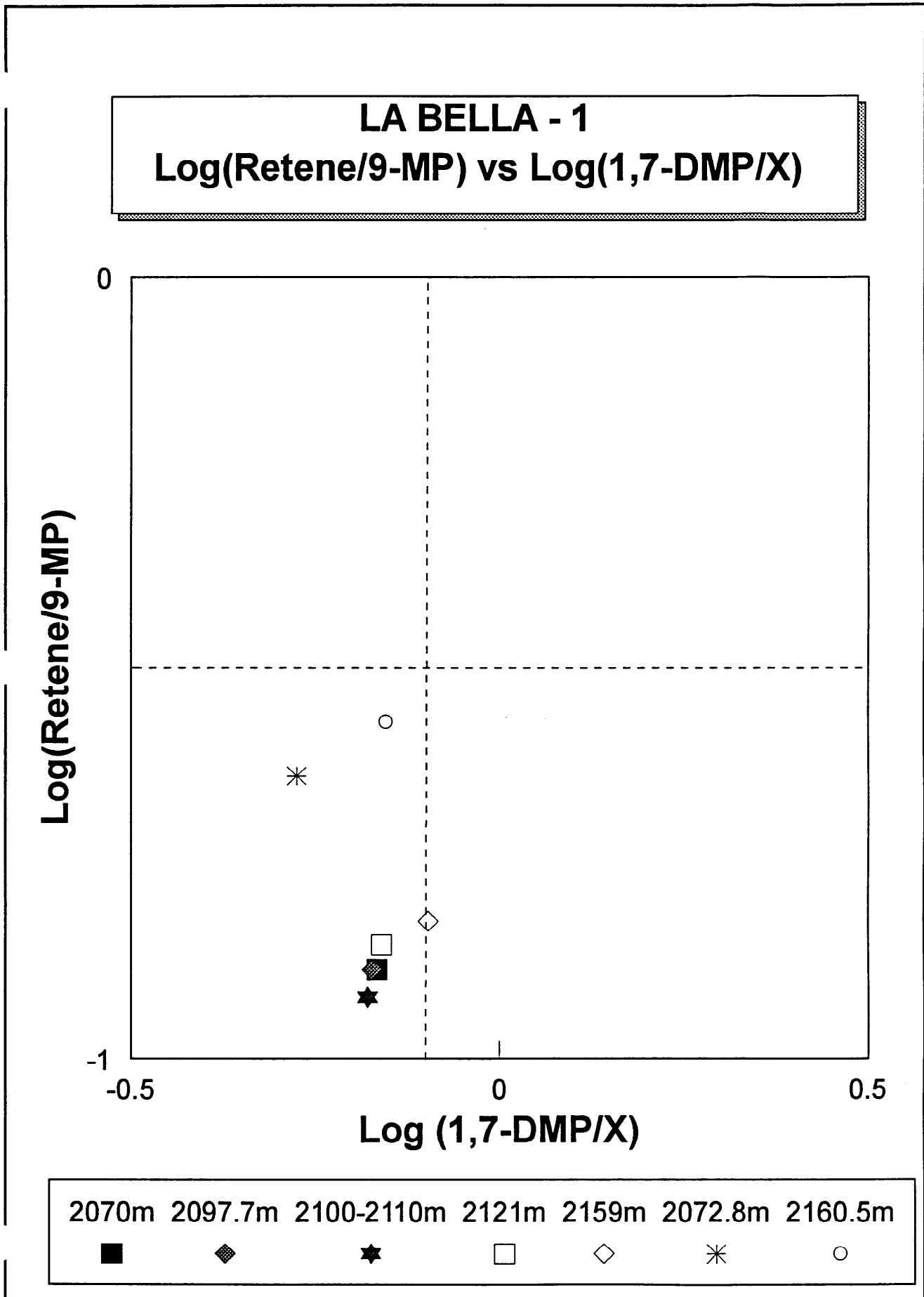
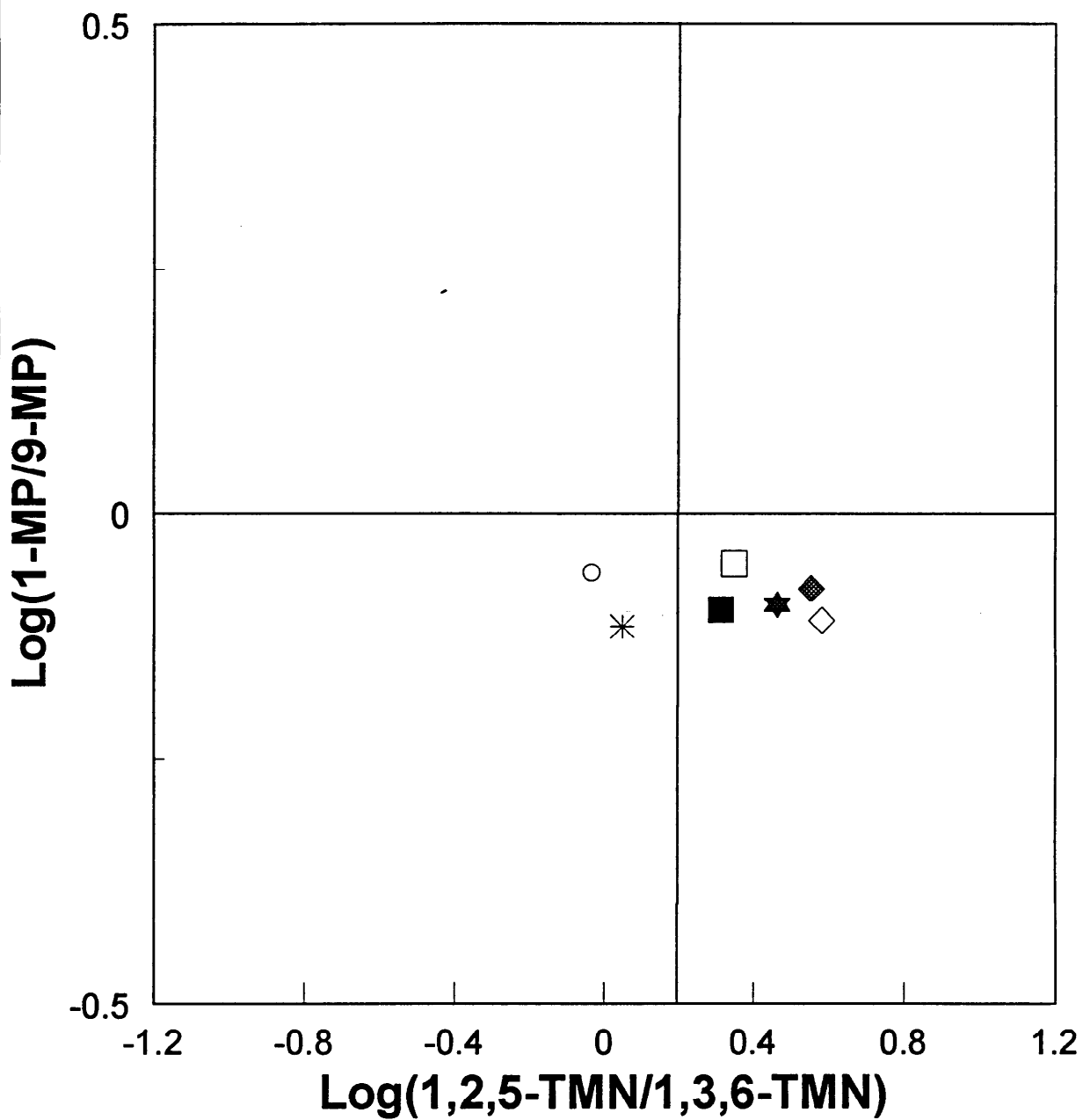


Figure 47a

LA BELLA - 1
Log(1-MP/9-MP) vs Log(1,2,5-TMN/1,3,6-TMN)



2070m 2097.7m 2100-2110m 2121m 2159m 2072.8m 2160.5m

■ ◆ ★ □ ◇ * ○

TABLE 26

GAS ANALYSIS DATA

=====

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DESCRIPTION : RFT SAMPLE

DEPTH 1(m) = 2072.80

DEPTH 2(m) = 2072.80

COMPOUND	% by VOLUME
-----	-----
Methane	77.10
Ethane	4.52
Propane	1.61
IsoButane	.27
n-Butane	.26
IsoPentane	.08
n-Pentane	.07
C6+	.05
Carbon Dioxide	12.04
Nitrogen	3.89
Hydrogen Sulphide	-
Oxygen	.10
Hydrogen	-
Helium	-
Argon	-

 NOTES : - = not reported

TABLE 27

GAS ANALYSIS DATA

=====

WELL = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

DESCRIPTION : RFT SAMPLE

DEPTH 1(m) = 2160.50

DEPTH 2(m) = 2160.50

COMPOUND	% by VOLUME
-----	-----
Methane	76.39
Ethane	4.78
Propane	1.74
IsoButane	.28
n-Butane	.30
IsoPentane	.09
n-Pentane	.08
C6+	.07
Carbon Dioxide	12.79
Nitrogen	3.37
Hydrogen Sulphide	-
Oxygen	.11
Hydrogen	-
Helium	-
Argon	-

 NOTES : - = not reported

LA BELLA - 1 Gas Analysis Data Normalised Relative Abundances

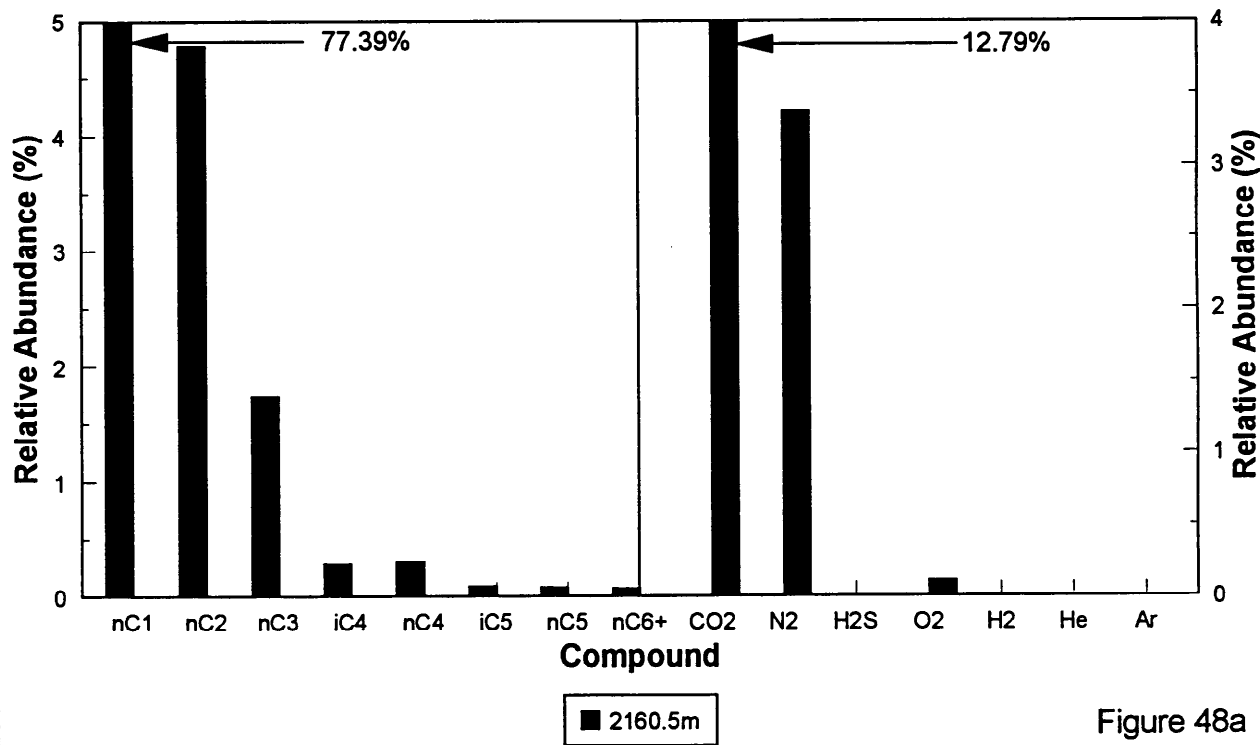
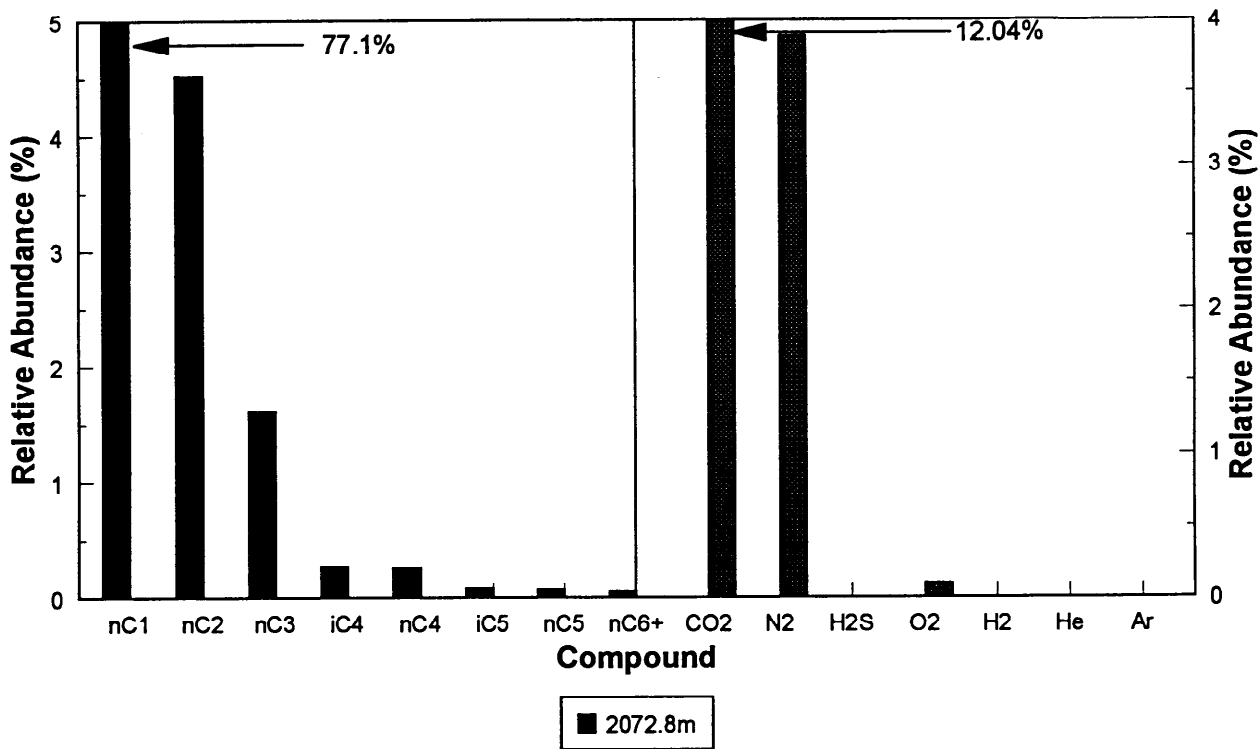
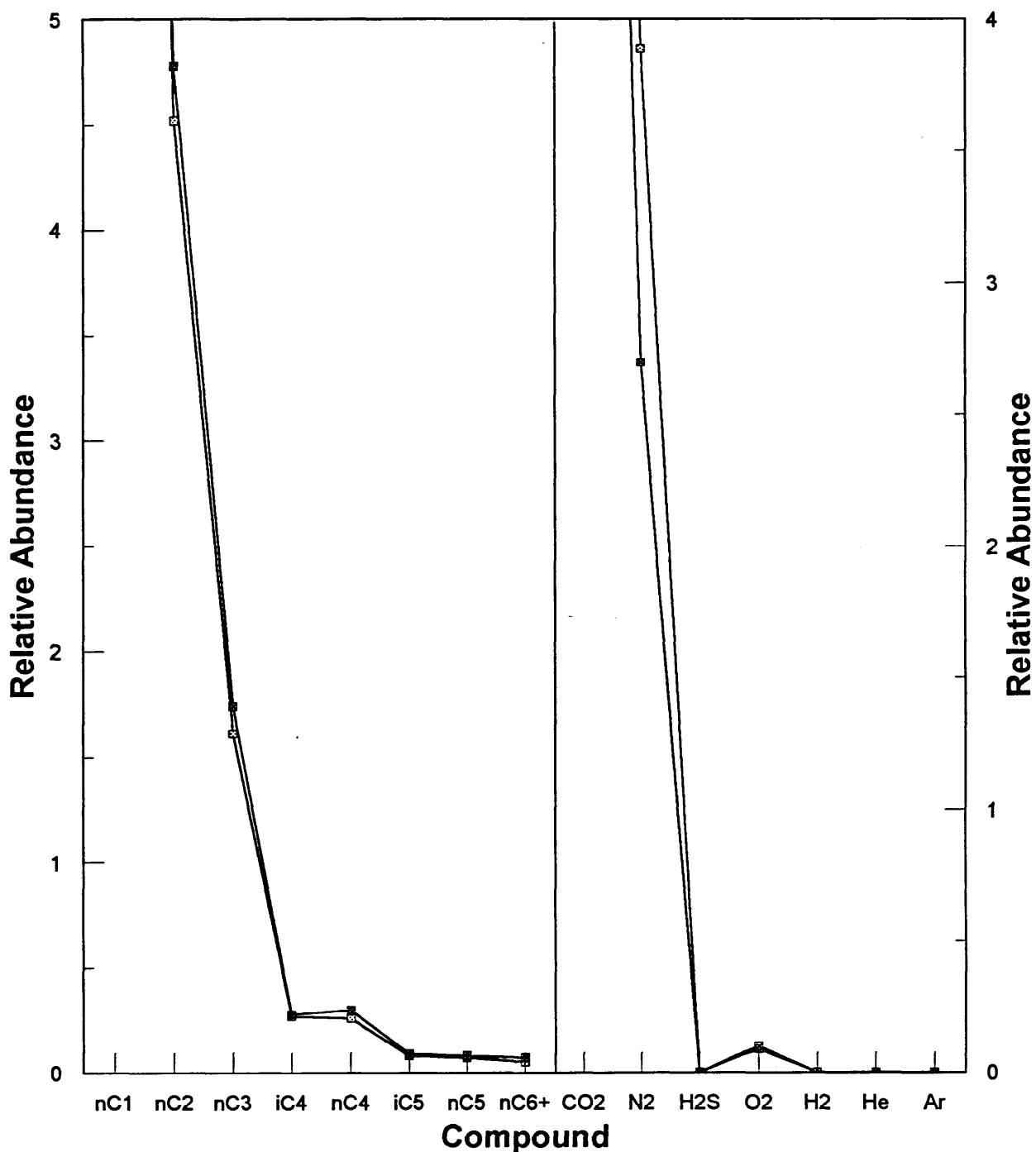


Figure 48a

LA BELLA - 1
Gas Analysis Data
Normalised Relative Abundances



2072.8m 2160.5m

—□— —■—

TABLE 20

CARBON ISOTOPE ANALYSIS DATA - GAS

WELL NAME = LA BELLA-1
 COUNTRY = Australia
 BASIN = Otway

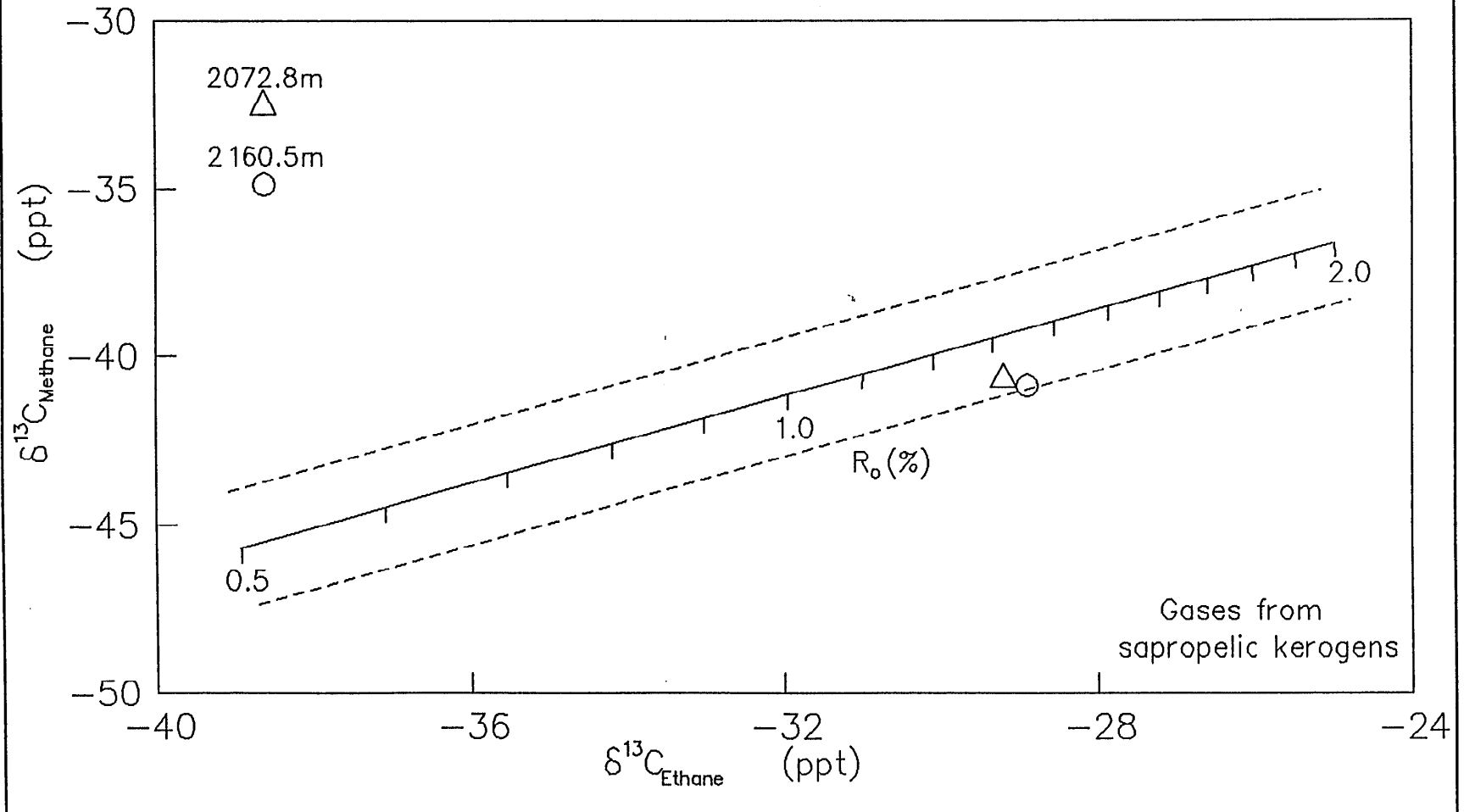
DEPTH UNIT = Metres
 DATE OF JOB = Oct 93

----- delta C VALUES -----									
DEPTH 1	DEPTH 2	METHANE	ETHANE	PROPANE	ISO-BUTANE	n-BUTANE	ISO-PENTANE	n-PENTANE	CARBON DIOXIDE
2072.80	2072.80	-40.70	-29.20	-27.10	-	-27.20	-	-26.20	-9.70
2160.50	2160.50	-40.90	-28.90	-26.90	-	-26.80	-	-26.30	-8.80

 All values permil relative to PDB
 - = no data

GAS ISOTOPE MATURATION PLOT 1

LA BELLA-1



LABL1/PE900368/P231

FIGURE 49a

GAS ISOTOPE MATURATION PLOT 2

LA BELLA-1

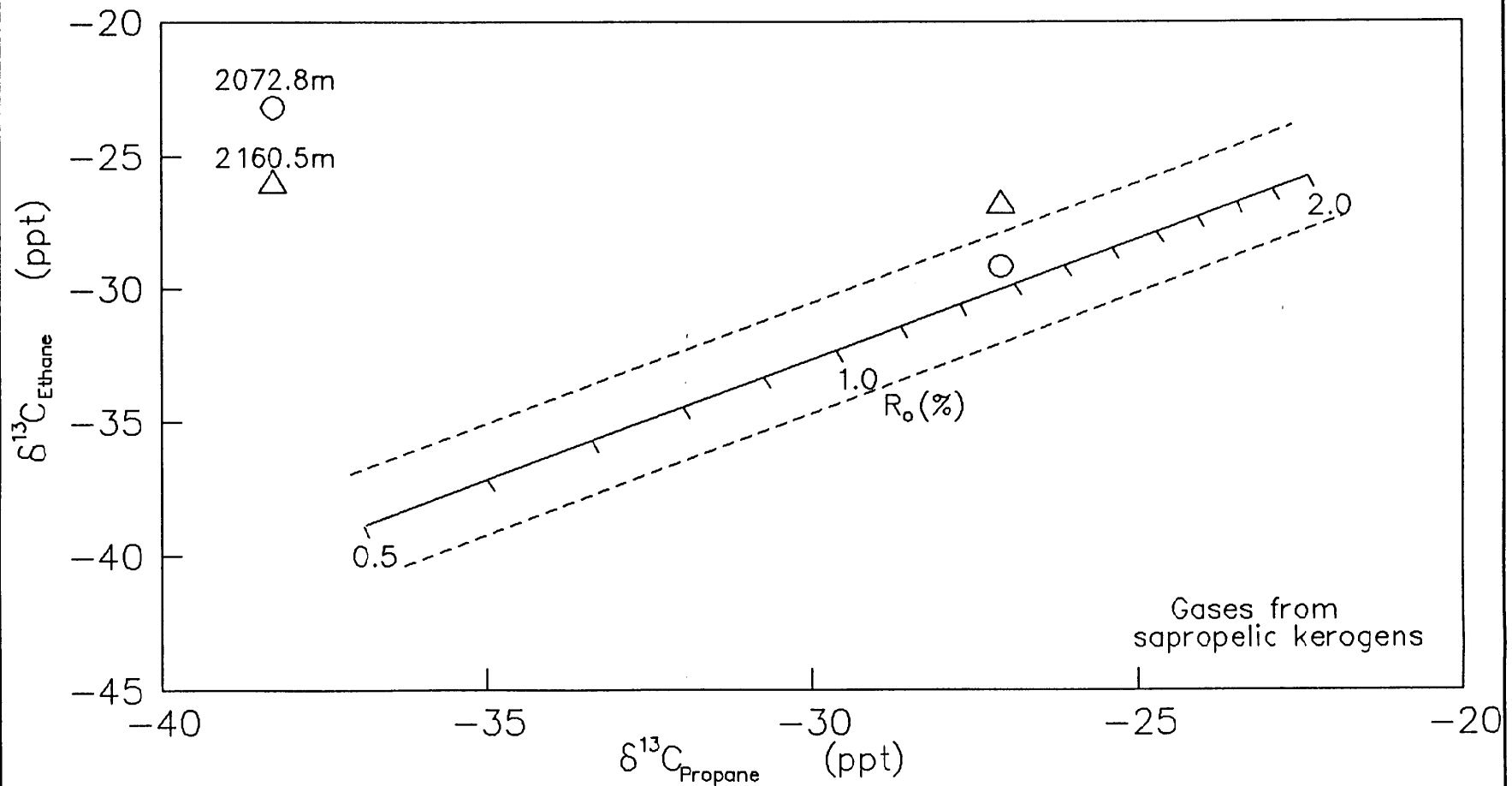
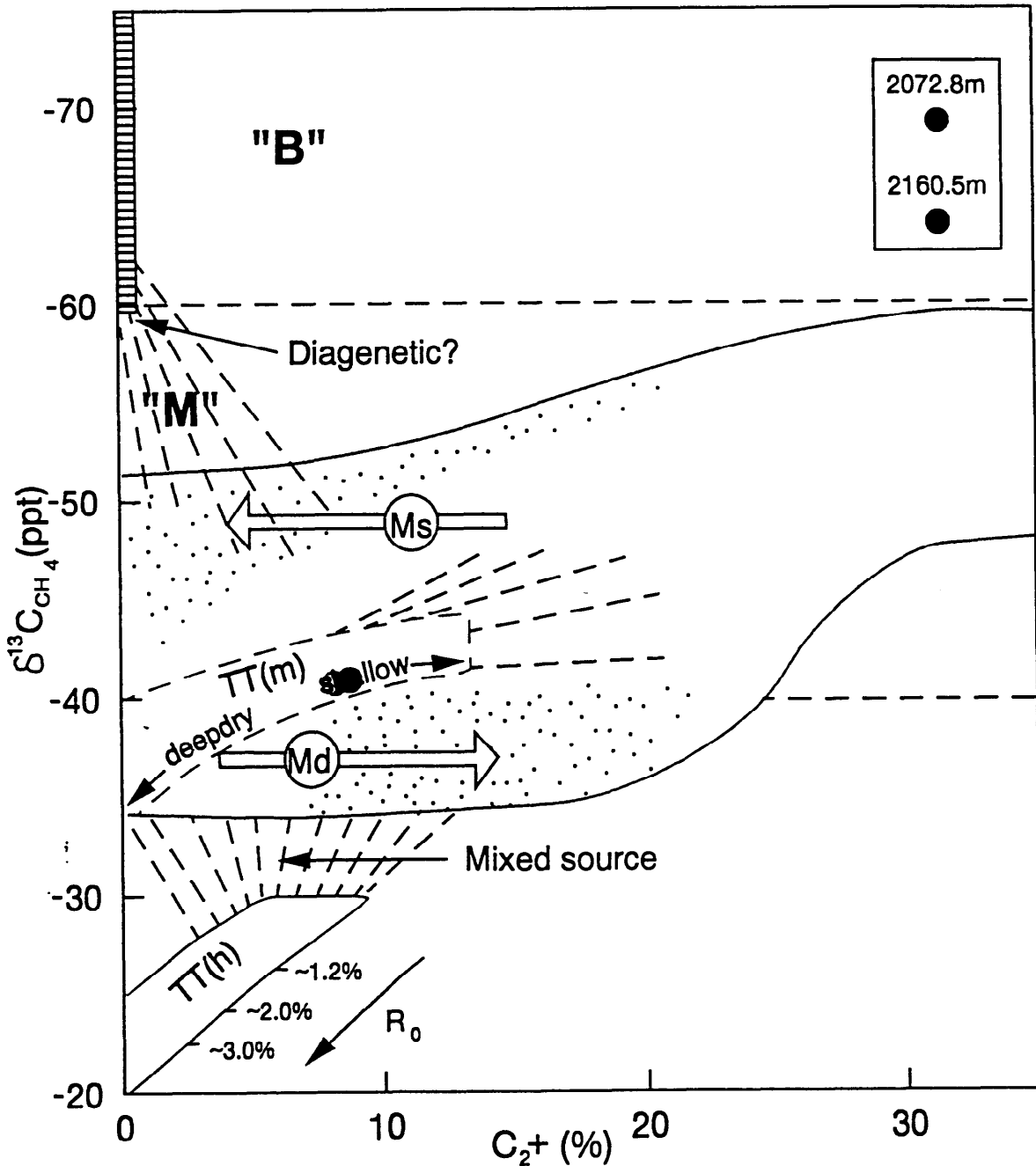


FIGURE 49b

FIGURE 50

GAS CHARACTERISATION PLOT LA BELLA-1



<ul style="list-style-type: none"> Mixed Migrated "B" = Biogenic gas "M" = Mixed gas 	<ul style="list-style-type: none"> TT(m) = Non-associated gas from a marine source TT(h) = Non-associated gas from a humic source Ms = Shallow migrated gas Md = Deep migrated gas
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