

NORTH VIKING GRABEN  
GEOCHEMICAL STUDY

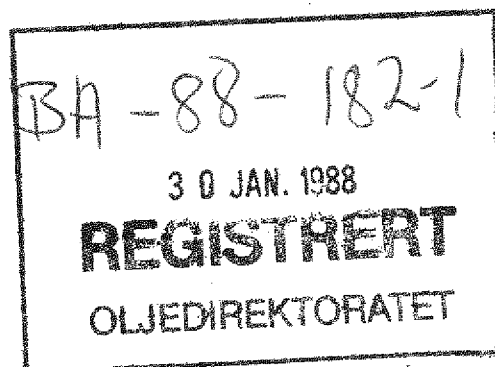
Well no. 30/6-5 NOCS

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INTRODUCTION

This well is from the Norwegian sector, to the east of the Oseberg field. The total drilled depth was 3550 m. Samples were collected between 1885 m and 3547 m from the Norwegian Petroleum Directorate in Stavanger. A total of 106 samples was collected, washed and described. The analysed section of the well is from 2428 - 3547 m, with a sampling interval of 3 m in the Jurassic (although only selected intervals were analysed). A careful selection of suitable samples was made for screening analysis (i.e. TOC and Rock-Eval analysis). Sixty-eight samples were selected for this analysis, and, from the data obtained, the samples for follow-up analysis were chosen. These are:

Thermal extraction - pyrolysis - gas chromatography	53 samples*
Extraction, MPLC fractionation, saturated and aromatic hydrocarbon gas chromatography	12 samples
Vitrinite reflectance microscopy	19 samples
Visual kerogen analysis	14 samples

\* Includes 12 composite samples for EOM analysis, which were solvent extracted, rather than thermal extracted, before pyrolysis-gas chromatography was performed.

Tables, listing in detail which samples were analysed and the results, are given in the appendix.

Figure 1 shows the general litho-variations and some of the screening data for this well and the location of samples for which follow-up analysis was done. Included in this figure are some of the problems encountered, which have affected

the choice of samples for analysis.

LITHOLOGY AND TOTAL ORGANIC CARBON CONTENT

Tertiary ( - 2203 m)

The samples in this interval consist mainly of grey-red and brown-grey claystones and dark yellow-brown and dusky yellow-brown dolomites and grey limestones down to 1933 m. Below 1933 m green-grey tuffs and green-grey and light olive-grey to medium grey to dark grey claystones dominate the samples. There are also smaller amounts of grey-red to red-brown claystones and grey limestones in the interval below 1933 m.

Cretaceous (2203 - 2452 m)

Samples consist of white to yellow-grey limestones (particularly above 2300 m) and claystones of various colours, including green-grey and olive-grey to medium grey and light brown-grey to brown-grey. In addition there are minor amounts of brown-grey and dark green-grey dolomitic limestones. Only two samples of the claystones were analysed. These were mostly olive-grey and have approximately 0.5 % TOC which indicates a fair source rock at best.

Jurassic (2452 - 3472 m)

Viking Group (2452 - 2841 m)

Draupne Formation (2452 - 2593 m)

The samples in this interval consist mostly of brown-black claystones and include some olive-black claystones below

2512 m. The claystones are silty below 2470 m and are classified as siltstones below 2533 m. There are smaller amounts of olive-grey, medium grey to medium dark grey and brown-grey claystones and traces of white limestones (which may be cavings). The TOC content of the brown-black and olive-black claystones/siltstones varies from 4.7 % to 7.7 % (rich). There is no obvious difference between the TOC of the claystones and the siltstones. The light coloured claystones have less than 0.5 % TOC (poor).

#### Heather Formation (2593 - 2841 m)

The samples consist mainly of a mixture of siltstones and olive-grey to medium grey claystones, with minor amounts of light grey to brown-grey limestones. Both major lithologies have been taken to be representative of the interval. The siltstones between 2593 m and 2701 m are brown-black similar to the Draupne Fm. siltstones. They have from 3.5 % to 5.1 % TOC (rich). The claystones have less than 0.7% TOC (fair). Below 2701 m the siltstones are sandy and generally lighter in colour, from yellow-grey to brown-grey, and have TOC values from 0.8 % to 1.5 % (fair to good). Light grey to olive-black and brown-black claystones in samples from 2722 m and 2764 m, have good (1.3 %) and rich (4.2 %) TOC values, respectively. The brown-black claystone from 2764 m may be caved from the Draupne Fm. sequence. The samples from the interval towards the base of the formation (2820 - 2841 m) consist mainly of coal additive and the actual sequence is considered to be mainly sandstones. Brown-grey claystones present in samples below 2785 m have poor TOC values (i.e. < 0.5 % TOC).

#### Brent Group (2841 - 2895 m)

Apart from a narrow interval between 2855 m and 2870 m, the sequence was cored. Based on log data the cored intervals

consist mainly of sandstones. Cuttings samples are considered to be mostly unrepresentative of the sequence. In the interval which was not cored, the dominant lithologies are white sandstones and grey-black to brown-black claystones (no TOC data). There is also some coal, which is considered to be mainly indigenous, although coal additive was reported higher up the interval.

Dunlin Group (2895 - 3223 m)

Drake Formation (2895 - 3071 m)

The formation was cored down to 2950 m. Log data indicates that the cored section consists mostly of sandstones. Below 2950 m samples still contain a large amount of caved sandstone. The dominant in-situ lithology between 2950 m and 3000 m is brown-grey to brown-black siltstone, which is carbonaceous and micaceous. The siltstones have good TOC values from 1.3 % to 1.8 %. Between 3000 m and 3020 m the dominant lithology is yellow-grey to light brown-grey sandstones, with less than 0.3 % TOC. The rest of the Drake Fm. (3020 - 3071 m) consists mainly of brown-grey to brown-black claystones with good TOC values, which vary only slightly from 1.85 % to 1.9 % in the three analysed samples. There may also be thin interbedded siltstones in this interval, with similar TOC values to the interval above 3000 m.

Cook Formation (3071 - 3120 m approximately)

The sequence consists mainly of sandstones and minor interbedded siltstones or claystones according to log data. The dominant lithologies in the samples are silty yellow-grey and brown-grey sandstones and brown-grey to brown-black siltstones, which may be partly indigenous and

partly caved. One analysed sandstone has a TOC value of less than 0.3 %.

Amundsen/Burton Formation (3120 - 3223 m)

The sequence consists mainly of sandstones with some interbedded claystones and siltstones, according to log data. The sandstones and siltstones in the analysed samples are similar to those in the Cook Fm., and the claystones are similar to those in the Drake Fm. below 3020 m. The TOC of the brown-grey to brown-black claystones varies from 0.8 % to 2.4 % (fair to rich) and the siltstones from 1 % to 1.7 % (good).

Statfjord Formation (3223 - 3472 m)

According to log data, this sequence consists mostly of sandstones. The dominant lithology in the samples is white to light grey coarse-grained sandstones, with 0.3 % to 1 % TOC, depending on the amount of carbonaceous material present in the sandstones. There are minor amounts of brown-grey to brown-black siltstones and claystones and grey-black claystones, which may be partly indigenous, at least for samples above 3425 m, which marks the top of the red-bed sequence. Below 3425 dusky brown and green-grey claystones are dominant. Above 3425 m claystones apparently have a considerable variation in TOC, from 1.2 % to 6.6 %, suggesting that they are good-rich source rocks. Coals are also present, presumably as thin beds and laminae.

Triassic (3472 m - TD (3550 m))

Samples consist mainly of sandstones and dusky brown and green-grey claystones, as is also indicated by the ~~composite~~ log<sup>s</sup>. The claystones have less than 0.7 % TOC and the high

X  
X

values may be due to the presence of coal fragments caved  
from the Statfjord Fm..

## ROCK-EVAL ANALYSIS

### 1. Kerogen Type and Richness

(Hydrogen Index, Oxygen Index and Petroleum Potential)

Tertiary ( - 2203 m)

No analysis was performed.

Cretaceous (2203 - 2452 m)

Only two claystone samples, from near the base of the Cretaceous interval, were analysed. Although they are slightly different in colour they have very similar Rock-Eval data. The petroleum potential of both samples is 0.3 and hydrogen indices are 43 and 47, which indicates type IV kerogen. The claystones have a very poor source rock potential for gas.

Jurassic (2452 - 3472 m)

Viking Group (2452 - 2841 m)

Draupne Formation (2452 - 2593 m)

Although the dominant brown-black claystones become silty and grade to siltstones (below 2533 m), the petroleum potentials are rich throughout the interval. They range from 23 - 47 (mostly 25 - 35) and the hydrogen indices vary from 432 - 588. The kerogen is type II throughout the interval and has a rich ~~source rock~~ potential for oil and gas. X

Heather Formation (2593 - 2841 m)

There are two source rock intervals in this sequence. Above 2701 m there are brown-grey to brown-black claystones and siltstones, similar to those in the lower part of the Draupne Fm.. The petroleum potential of these varies from 12 to 22 and the hydrogen indices from 210 - 420. Although it is probable that some caving from the Draupne Fm. has occurred, the data are probably reasonably representative and indicate that the siltstones have type II/III kerogen, with a good-rich potential for condensate and gas. Below 2701 m siltstones are lighter coloured, mostly brown-grey and have petroleum potentials from 1 - 5 and hydrogen indices from 122 - 307. The brown-grey siltstones in the interval from 2701 m to 2800 m have a fair potential as source rocks for gas and condensate. Interbedded with the good source rocks are olive-grey, light to medium grey and brown-grey claystones, which have poor source rock potential (i.e. type IV kerogen and petroleum potentials less than 1). The relative proportion of fair to poor source rock is difficult to assess.

In addition there are olive-black and brown-black claystones, probably as thin interbeds in the mainly siltstone interval below 2700 m, which have a good to rich potential for gas and condensate (petroleum potentials of two analysed samples, from 2722 and 2764 m, are 3 and 17 and hydrogen indices 187 and 389, respectively). Below 2800 m the sequence consists mostly of sandstones.

Brent Group (2841 - 2895 m)

The sequence consists mainly of sandstones, with thin claystones and coal beds. Only coals were analysed, and with petroleum potentials of 117 and 140 and hydrogen indices of 265 and 246 (type II/III kerogen), they clearly have a very rich potential for gas and probably condensate.

Dunlin Group (2895 - 3223 m)

Drake Formation (2895 - 3071 m)

There are two main source rock intervals in this sequence, which are from 2950 - 3000 m and 3020 - 3071 m, approximately. Sandstones make up the bulk of the rest of the sequence (i.e. above 2950 m and between 3000 m and 3020 m). Between 2950 - 3000 m the main lithology is brown-grey to brown-black siltstones, which are unlikely to be affected by cavings from the Viking Group, since the well was cased just above 2800 m. These siltstones have petroleum potentials from 2 - 3 and hydrogen indices of 146 - 169, which indicates that they have a fair gas potential. Below 3020 m the main lithology is brown-grey to brown-black claystones with petroleum potentials from 8 - 9 and hydrogen indices of 400 - 416, which indicates a good potential for oil and gas.

Cook Formation (3071 - 3120 m)

Only one sandstone sample was analysed in this sequence. It probably contains some residual migrated hydrocarbons (see later discussion).

Amundsen/Burton Formations (3120 - 3223 m)

The sequence consist mainly of sandstones, the minor claystones and siltstones have petroleum potentials from 2 - 6 and hydrogen indices from 139 - 269, which indicates that they have a poor to fair potential for gas and some condensate.

Statfjord Formation (3223 - 3472 m)

The sequence consists mainly of sandstones. There are minor amounts of brown-grey to brown-black claystones which could include material caved from higher formations. The petroleum potentials of three analysed samples are 5,6 and 18. The high value may be due to the presence of coal laminae in the claystone. The hydrogen indices fall in the range from 200 - 300 and indicate the presence of type II/III kerogen. Two coals found in the samples from this sequence have very high petroleum potentials (230, 277) and hydrogen indices greater than 400, indicating the presence of type II kerogen. They are, presumably, rich in liptinites. The minor claystones and coals in the sequence have a fair to very rich potential for condensate and gas and probably some oil. Below 3425 m the dominant claystones are dusky-brown and green-grey with virtually no source rock potential (petroleum potential less than 0.5, and type IV kerogen).

Triassic (3472 - 3550 m, TD)

This sequence consists of sandstones, with no source rock potential and dusky-brown and green-grey claystones, with virtually no source rock potential. Traces of caved brown-black and dark-grey claystone have raised the petroleum potentials of the indigenous dusky-brown claystones to greater than 1.

2. Generation and Migration

(Production Index  $S_1/S_1+S_2$  and  $S_1/TOC$ )

Oil shows were recorded in the cored section of the Brent Group sandstones. In the Dunlin Group interval the sandstones have production indices from 0.2 - 0.4 (figure 2), which may indicate the presence of migrated hydrocarbons. The small amount of the  $S_1$  in these samples

suggests only trace amounts are present. The claystones and siltstones in the Jurassic have production indices ranging from 0.05 to 0.15, suggesting that only minor hydrocarbon generation has occurred. The light coloured siltstones and claystones in the Heather Fm. and in the Dunlin Group, have the highest production indices (between 0.1 and 0.15), and although  $S_1$  values are low, this may also indicate the presence of migrated hydrocarbons. In the Statfjord Fm., below 3400 m, and in the Triassic, claystones and sandstones have very high production indices ranging from 0.3 to 0.7. The indigenous organic matter has not generated hydrocarbons since it has virtually no hydrocarbon potential (the claystones and sandstones in this interval are very poor in organic matter). Therefore, the hydrocarbons in this interval are either migrated or derived from a contaminant.

### 3. Maturity (Tmax)

Tmax values range from 425 to 440 (figure 3) over the Jurassic interval 2452 m - 3472 m. The Jurassic is immature at the top and oil window mature at the bottom. Peak oil generation for type II kerogens is probably not reached in the Jurassic interval. Therefore, the mainly type III and II/III kerogens in the minor claystones of the Statfjord Fm., which have reached oil window maturity, will not have reached peak oil generation. However, early light hydrocarbon generation has probably occurred.

## EXTRACTION DATA

Viking Group (2452 - 2841 m )

Draupne Formation (2452 - 2593 m)

Five samples of brown-black claystone/siltstone were extracted. EOM and extractable hydrocarbon contents of all samples are high, ranging from 3629 ppm to 7840 ppm EOM and from 1446 ppm to 3040 ppm extractable hydrocarbons. EOM contents of the samples above 2512 m are highest (7840 ppm and 7045 ppm). This interval, 2452 - 2512 m, is where the pyrolysis-gc and visual kerogen composition analysis, indicates the most liptinite/algal-rich interval. The claystones and the siltstones and silty claystones, below 2512 m, can all be classified as rich source rocks, based on EOM data. Values of EOM, normalised to TOC, also indicate a good - rich source rock (72 - 100 mgs EOM/g TOC). The amounts of extractable hydrocarbons, normalised to TOC, are fairly low (13 - 81 mgs HC/g TOC). Most values suggest only trace amounts of hydrocarbon have been generated from the kerogen. The high percentage of extractable hydrocarbons, particularly in the three silty samples from below 2712 m, may be due to the presence of migrated hydrocarbons (42 % to 70 %). The maturity of the sequence is not thought to be high enough for hydrocarbon percentages higher than 30 %.

Heather Formation (2593 - 2841 m)

Three samples were extracted. These were: two brown-black siltstone samples from 2641 m and 2701 m and a brown-grey siltstone from 2785 m. The two darker siltstone samples have EOM contents similar to Draupne claystones (3475 ppm and 7973 ppm) and hydrocarbon contents greater than 2000 ppm. This data indicates that they are rich source rocks. The

high percentage of hydrocarbons, 30 - 56 %, is probably due to the presence of migrated hydrocarbons. The EOM and extractable hydrocarbon content of the brown-grey siltstone from 2785 m, indicates only a fair to good source rock (1246 ppm EOM, 397 ppm HC).

Brent Group (2841 - 2895 m)

A coal from 2866 m was extracted. The very high amount of EOM (34210 ppm) and extractable hydrocarbons (9605 ppm) is typical for coals. The percentage of extractable hydrocarbons in the EOM is quite high for a coal (24 %) and this may be due to the presence of migrated hydrocarbons.

Dunlin Group (2895 - 3223 m)

Drake Formation (2895 - 3071 m)

Two claystone/siltstones were analysed. The sample from 2986 m is from the upper argillaceous interval of the Drake Fm. and consists of brown-grey to brown-black siltstone. The other sample, from 3061 m, is a brown-grey to brown-black claystone from the lower argillaceous interval. They can both be classified as good-rich source rocks based on EOM content (2832 ppm, 3178 ppm). The hydrocarbon content of the EOM is very high, 59 % and 84 %. The presence of migrated or contaminant hydrocarbons is indicated since the sequence is not <sup>or only just</sup> within the oil window.

Cook Formation (3071 - 3120 m approx.)

No samples were analysed.

Amundsen/Burton Formations (3120 - 3223 m)

One sample of brown-grey to brown-black claystone from 3205 m was extracted, it has very similar extract data to the Drake claystones and conclusions are that migrated, or contaminant, hydrocarbons are present.

Statfjord Formation (3223 - 3472 m)

No samples were analysed from this formation.

Triassic (3472 - 3550 m, TD)

No samples were analysed from this sequence.

Saturated Hydrocarbons

Viking Group (2452 - 2593 m)

Draupne Formation (2452 - 2593 m)

The gas chromatograms of the five samples from this interval suggest that the organic matter has not reached peak oil generation. For example, pristane/nC<sub>17</sub> ratios are quite high (about 1 or slightly greater than 1) and there are abundant steranes and triterpanes. There are distinct differences in the hydrocarbon distributions of the top two samples (2470 m and 2512 m) and the two samples below these (2533 m, 2557 m). This could be related indirectly to the increase in silt below 2500 m. The n-alkane envelope of these four samples ranges from nC<sub>12</sub> to nC<sub>40</sub>, with a maximum at nC<sub>15</sub> or nC<sub>16</sub>. However, there is a prominent shoulder of high molecular weight n-alkanes from nC<sub>20</sub> to nC<sub>35</sub> in the top two samples

(figure 4), not seen in the lower two (figure 5). This suggests a major difference in the organic input. Pristane/ $nC_{17}$  and phytane/ $nC_{18}$  ratios are slightly higher in the lower two samples, suggesting that there has also been a larger input of n-alkanes from  $nC_{17}$  to  $nC_{20}$  in the upper two samples. This difference in input may be related to the amount of algal material present in the samples (according to pyrolysis-gas chromatograms, this is greatest in samples above 2500 m). There is also a marked increase in the prominence of the peak occurring between  $nC_{29}$  and  $nC_{30}$  (measured relative to the isoprenoid pristane, not against the n-alkanes), which is considered to be a triterpane. This may also mark a change of input. x

There is a very slight even n-alkane preference between  $nC_{19}$  and  $nC_{25}$  and a very slight odd n-alkane preference between  $nC_{26}$  and  $nC_{28}$ . The pristane/phytane ratio is fairly constant at about 1.5, which suggests that the depositional environment was fairly constant during deposition of sediments, in the interval from which the four samples were selected. This pristane/phytane value is quite high for immature Draupne Fm. claystones, compared with other areas (e.g. 25/2-6 and East Shetland Basin wells). Low pristane/phytane values (i.e. <1) and prominent even n-alkane preference from  $nC_{19}$  to  $nC_{27}$  in the immature (and even mature) Draupne Fm. claystones in other areas, are taken as indications that the claystones were deposited in a highly anoxic environment. The depositional environment of the Draupne Fm. in the area of 30/6-5, may have been less anoxic than in other areas. However, the presence of abundant organic matter in the sediments indicates that preservation conditions were as good as in other areas. It may be that there is an abnormally high input of algal material throughout the Draupne Fm. in the 30/6-5 area, compared with other areas, and this may have affected the relative amounts of pristane and phytane in a way which cannot be explained at present, or as it is suggested from extract data, that there are migrated hydrocarbons present.

The lowest sample analysed from the Draupne Fm. is dominated by the high molecular weight n-alkanes, seen in the top two samples and the maximum occurs at  $nC_{20}$  (figure 6). This suggests that organic input was similar to the top two samples.

#### Heather Formation (2593 - 2841 m)

The saturated hydrocarbon gas chromatogram of the sample of brown-black siltstone from 2599 m, is very similar in pattern to the two Draupne Fm. siltstones from 2533 m and 2557 m. This indicates either a very similar input and depositional environment, or that caved material from the Draupne Fm. has been analysed. The brown-black siltstone from 2701 m and the brown-grey siltstone from 2785 m, have a similar hydrocarbon distribution (figure 7) to each other, which is quite different to the Draupne Fm. samples. The n-alkane envelope is front-end biased and unimodal, like the two Draupne Fm. siltstones from 2533 m and 2557 m. However, the maximum is at  $nC_{17}$ , with a slightly shorter range from  $nC_{14}$  to  $nC_{37}$ . In addition the pristane/phytane ratio is much higher in the Heather siltstones ( $\sim 2.5$ ), suggesting a less anoxic depositional environment than for the Draupne Fm.. The Heather samples show a slight, but distinct, odd n-alkane preference between  $nC_{22}$  and  $nC_{32}$ , which suggests that the n-alkanes in this range are probably derived from higher plant matter. The triterpane/sterane component, between  $nC_{25}$  and  $nC_{35}$ , is much less prominent than in the Draupne Fm. samples, which suggests a lower algal/bacterial input to the Heather Fm. sediments.

#### Brent Group (2841 - 2895 m)

The gas chromatogram of the coal from 2866 m (figure 8), shows an n-alkane envelope from  $nC_{14}$  to  $nC_{35}$ , with a maximum at  $nC_{25}$ . There is a distinct odd n-alkane preference from

$nC_{18}$  to  $nC_{30}$ . The pristane/ $nC_{17}$  ratio is greater than one, and the pristane/phytane ratio is greater than 5. This is typical for a moderate mature coal in which most of the organic matter is derived from higher plant matter, deposited in swamp conditions.

Dunlin Group (2895 - 3223 m)

Drake Formation (2895 - 3071 m)

The n-alkane pattern of the two analysed samples is similar to the lower Heather siltstones. However, there are differences, particularly in the amount of isoprenoids and in the relative amounts of n-alkanes of chain length, less than and greater than  $nC_{20}$ . Normal alkanes between  $nC_{12}$  and  $nC_{20}$  are much more prominent in the Drake samples (this can be seen from the low pristane/ $nC_{17}$  values ( $<1$ )), particularly of the deeper sample, from 3061 m (figure 9). This hydrocarbon pattern is representative of highly mature, marine source rock. The sequence is early mature - oil window mature, but it is considered that the hydrocarbon pattern is representative of an even more mature source rock than this sequence. It is, therefore, probable that the hydrocarbons are partly migrated and partly indigenous. Although the mud log gives no indication, it is also possible that the cutting could be contaminated with diesel, which is often used in the drilling mud.

Cook Formation (3071 - 3120 m approx.)

No samples were analysed from this formation.

Amundsen/Burton Formations (3120 - 3223 m)

One sample of brown-grey to brown-black claystone from 3205 m was analysed. The n-alkane envelope is bimodal with maxima at nC<sub>17</sub> and nC<sub>23</sub> and a range from nC<sub>14</sub> to nC<sub>37</sub> (figure 10). The dominant n-alkanes are mainly those from nC<sub>20</sub> to nC<sub>30</sub> and with the slight, but distinct, odd n-alkane preference from nC<sub>22</sub> to nC<sub>34</sub>, suggest a major input of higher plant material. The bimodal distribution and low pristane/nC<sub>17</sub> and ratio (<0.5) suggest that some of the lower molecular weight n-alkanes (i.e. less than nC<sub>20</sub>) have been generated from the kerogen, although the presence of migrated hydrocarbons cannot be ruled out.

Statfjord Formation (3223 -3472 m)

No samples were large enough for analysis. Therefore, interpretation of extractable hydrocarbons is based on the thermal extraction gas chromatograms.

Triassic (3472 - 3550 m, TD)

No samples were analysed from this sequence.

Aromatic Hydrocarbons

Viking Group (2452 -2841 m)

Draupne Formation (2452 - 2593 m)

Several features of the aromatic hydrocarbon distributions support the view that the Draupne Fm. claystones/siltstones are of low maturity. These include the prominent hump of

high molecular weight hydrocarbons (aromatic steranes and triterpanes and polycyclic aromatics) and the low aromatic ratios. Particularly important are the aromatic sulphur ratios 4/1MDBT and 3+2/1MDBT. The other common aromatic ratios, e.g. MNR, DMNR and MPI2 are also low, but not the MPI1, which is affected by the large coeluting 1 - methyl dibenzothiophene, and, therefore, cannot be considered to be accurate.

There is a marked difference between the top two samples (figure 11) and the other three samples (figure 12). The unresolved hump is larger in the top two samples than in the other three. Alkyl naphthalenes are much more prominent in the lower three samples, as is an unidentified compound (peak marked with an asterisk in figure 12). There are also less of the sulphur aromatics, relative to non-sulphur aromatics (e.g. dibenzothiophene to phenanthrene), in the top two samples. It is considered that these differences may be due to a greater algal input in the upper two samples, as was suggested by the differences in the saturated hydrocarbon gas chromatograms.

#### Heather Formation (2593 - 2841 m)

The aromatic hydrocarbon gas chromatogram of the top siltstone sample, from this formation, resembles those of the samples from the lower part of the Draupne Fm. The other two samples are similar in aromatic hydrocarbon distribution to each other, but unlike the top sample. In these samples the unresolved hump is much smaller and a few peaks dominate the samples (figure 13). The dominant compounds in the chromatograms are phenanthrene, the methylphenanthrenes and an unidentified compound, which is also present in the Draupne samples. Sulphur aromatics are also less prominent. These observations indicate a less anoxic depositional environment and a greater higher plant matter input in the Heather Fm. than in the Draupne Fm.

Brent Group (2841 - 2895 m)

The aromatic hydrocarbon gas chromatogram (figure 14) of the Brent coal which was analysed, shows a number of peaks which have not been identified (marked by an asterisk in figure 14). This is in addition to the alkyl naphthalenes, phenanthrenes and polycyclic aromatics. The relatively small amounts of alkyl naphthalenes suggest that the coal is immature to moderate mature. The MPI1 value suggests a maturity equivalent to a vitrinite reflectance of 0.5%. The unidentified compounds may be higher plant markers.

Dunlin Group (2895 - 3223 m)

Drake Formation (2895 - 3071 m)

The gas chromatograms of the two siltstone/claystones, which were analysed in this interval, are untypical for type II/III or II kerogens, which are early mature. The dominant aromatics should be alkyl naphthalenes. However, phenanthrene and alkyl phenanthrenes are the dominant compounds (figure 15). Aromatic ratios, such as MPI1, suggest a much higher maturity than for the coal in the Brent Group. It is probable that the aromatics in these samples consist, at least in part, of residual migrated hydrocarbons, since alkyl naphthalenes would be expected in "fresh" migrated hydrocarbons.

Cook Formation (3071 - 3120 m)

No samples were analysed from this formation.

Amundsen/Burton Formations (3120 - 3223 m)

One sample of claystone from 3205 m was analysed, it resembles very closely the Drake Fm. claystones, in aromatic hydrocarbon distribution and the same conclusions have been made for this sample as for the Drake Fm. samples.

Statfjord Formation (3223 - 3472 m)

No samples were analysed from this formation.

Triassic (3472 - 3550 m, TD)

No samples were analysed from this sequence.

## THERMAL EXTRACTION - GAS CHROMATOGRAPHY

Viking Group (2452 - 2841 m)

Draupne Formation (2452 - 2593 m)

Ten samples, both claystones and siltstones, were analysed. The thermal extraction gas chromatograms of the claystones above 2512 m have distinct differences to the siltstones below 2512 m. The chromatograms of the samples above 2512 m are dominated by low molecular weight hydrocarbons from  $nC_5$  to  $nC_{20}$  and, particularly, from  $nC_5$  to  $nC_{10}$  (figure 16). The dominant n-alkanes are from  $nC_{11}$  to  $nC_{20}$ . The hydrocarbons before  $nC_{10}$  presumably consist mainly of aromatic and saturated branched and cyclic hydrocarbons. Naphthalene and the alkyl naphthalenes are also prominent components of the gas chromatograms.

In the samples below 2512 m, there is generally less material between  $nC_5$  and  $nC_{10}$  and the dominant hydrocarbon distribution is from  $nC_{10}$  to  $nC_{25}$  (figure 17). The alkyl naphthalenes are very prominent, as are the n-alkanes from  $nC_{15}$  to  $nC_{22}$ . The dominant n-alkanes are  $nC_{17}$  and  $nC_{19}$ . The lack of  $C_{20+}$  alkanes in the samples above 2512 m, compared with those below this depth, appears to contradict the saturated hydrocarbon gas chromatograms, which show that  $C_{20+}$  hydrocarbons are more prominent in samples above 2512 m than below. The apparent contradiction can be explained by differences in the nature of organic matter, making up the type II kerogen, in the formation. The top interval is considered to be more algal-rich than the deeper interval, and it may be that the  $nC_5$  to  $nC_{15}$  component is much more abundant because of this. At higher maturities the algal-rich section (which is only immature to moderate mature in this well) will generate more  $C_{20+}$  hydrocarbons. The n-alkanes of the deeper interval are presumably derived

from a more mixed algal/bacterial and lipid-rich higher plant material which will have more  $nC_{20+}$  alkanes (i.e. from wax on cuticles etc.) at low maturities.

#### Heather Formation (2593 - 2841 m)

Twelve samples were analysed and, apart from the sample from 2599 m near the top of the formation, the hydrocarbon distribution has a narrow range from  $nC_5$  to  $nC_{18}$  in which the alkyl naphthalenes and phenanthrenes are dominant. The distribution is typical for kerogens with a large land plant input. A typical example is shown in figure 18. The sample from 2599 m is similar to the lower Draupne Fm. samples and may include some caved material from that section.

#### Brent Group (2841 - 2895 m)

Two coal samples were analysed. The thermal extract gas chromatograms are typical for immature to moderate mature coals, i.e. derived mainly from land plant debris. Aromatics, including the diaromatics (N, MN, DMN) are very prominent components, whereas saturated hydrocarbons, such as the n-alkanes, with similar retention times to these aromatics, are relatively minor components.

#### Dublin Group (2895 - 3223 m)

#### Drake Formation (2895 - 3071 m)

Five samples were analysed: two siltstones from the upper argillaceous member (2900 - 2950 m) and three claystones from the lower argillaceous member (3020 - 3071 m). The chromatograms of samples from the two members are significantly different. The chromatograms of the siltstones

(figure 19) are dominated by low molecular weight hydrocarbons, mainly in the range from  $nC_5$  to  $nC_{17}$  and a large unresolved hump, in the range from  $nC_{15}$  to  $nC_{30}$  (approx). The dominant hydrocarbons in the  $nC_5$  to  $nC_{17}$  range are the n-alkanes, from  $nC_{11}$  to  $nC_{17}$  and the alkyl naphthalenes. This is fairly typical for type III kerogens, which can source mainly gas and condensate. The large unresolved hump probably represents residual migrated hydrocarbons.

The claystones in the lower member are dominated by n-alkanes from  $nC_{12}$  to  $nC_{24}$ , with a maximum at  $nC_{16}$  or  $nC_{17}$  (figure 20). This n-alkane dominated pattern is typical of mature source rocks and diesel contaminated cuttings. It is considered that the Drake Fm. claystones have not reached the maturity level necessary to produce the pattern seen in the samples. Hence, either migrated or contaminant hydrocarbons are present in samples of this sequence.

Cook Formation (3071 - 3120 m, approx.)

No samples from this formation were analysed.

Amundsen/Burton Formations (3120 - 3223 m)

Six samples were analysed. Two chromatographic patterns are recognisable. One consists of low molecular weight hydrocarbons in the range from  $nC_5$  to  $nC_{15}$  and mostly from  $nC_5$  to  $nC_{10}$ . The other consists mostly of  $nC_{10}$  to  $nC_{20}$  alkanes, which appears to be superimposed on the first chromatographic pattern. The  $nC_{10}$  to  $nC_{20}$  alkanes are probably from a migrated or contaminant source. The low molecular weight hydrocarbons, from  $nC_5$  to  $nC_{15}$ , are probably derived from the indigenous organic matter in the samples. This range of hydrocarbons indicates that the siltstone/claystones in the sequence are probably only

gas/condensate source rocks since the sequence is considered to be early-oil window mature and oil prone source rocks have generally produced some  $C_{15+}$  hydrocarbons at this maturity level.

Statfjord Formation (3223 - 3472 m)

Five samples were analysed: two coals and three claystones. The chromatograms of the coals are fairly typical of early mature coal samples and are dominated by aromatic hydrocarbons, particularly the alkyl naphthalenes and phenanthrenes (figure 21). The chromatograms of the claystones are similar to the coals, in that aromatics are very prominent and this may be due to the presence of coaly laminae in the claystones. Unlike the coals, two claystones also have a distinct n-alkane from  $nC_{12}$  to  $nC_{23}$  (figure 22). This suggests that the claystone have some liquid hydrocarbon potential. The deepest claystone sample has a chromatogram which is dominated by n-alkanes in a narrow range from  $nC_{13}$  to  $nC_{20}$ . It is considered that this represents a contaminant on the cutting which is probably diesel.

Triassic (3472 - 3550 m, TD)

One claystone sample from 3493 m was analysed. It contains only trace amounts of hydrocarbons, which consist of low molecular weight hydrocarbons ( $<nC_{12}$ ). The distribution is typical of a poor gas prone claystone.

## PYROLYSIS - GAS CHROMATOGRAPHY

Viking Group (2452 - 2841 m)

Draupne Formation (2452 - 2593 m)

Fifteen samples from this interval were pyrolysed. Ten were thermally extracted before pyrolysis, the other five were composite samples, which were solvent extracted before pyrolysis was performed. The pyrograms are all very similar. The pyrograms are typical of alginite-rich marine kerogens. The main features are: a very pronounced unresolved hump from  $C_4$  to  $nC_{30}$ , a prominent alkene/alkane homology over the same alkane range and the alkene/alkane homology from  $nC_{10}$  to  $nC_{20}$  is particularly prominent. The alkene/alkane homology is most pronounced in the samples above 2500 m (figure 23).

Heather Formation (2593 - 2841 m)

Fifteen samples, twelve thermally extracted samples and three solvent extracted, composite, samples were pyrolysed. Apart from the top sample from 2599 m, which has a pyrogram pattern very similar to the Draupne Fm. pyrograms and probably consists mainly of caved Draupne siltstone, the rest of the pyrograms can be divided into two groups: those from samples above 2700 m and those from below 2700 m.

The sequence above 2700 m consists mainly of brown-black siltstones and claystones with type II/III kerogen (based on Rock-Eval data). Although the pyrograms are very similar to those from the Draupne Fm., there are slight, but significant, differences. The main differences are that the unresolved hump and alkene/alkane homology between  $nC_{10}$  and  $nC_{30}$  are less prominent than for the Draupne Fm. samples

(figure 24). In addition aromatics such as xylene and methylnaphthalenes, are slightly more prominent. The main conclusions from this are that the Heather samples, above 2700 m, are less liptinite rich and, therefore, have a lower liquid hydrocarbon potential.

The sequence below 2700 m consists mainly of brown-grey siltstones with a few brown-black or olive-black claystones. Samples of each type were pyrolysed. The pyrograms of the brown-grey siltstones are dominated by low molecular weight material, i.e. less than  $nC_{15}$  and the alkene/alkane homology dominates from  $nC_8$  to  $nC_{20}$  (figure 25). There is only a slight unresolved hump between  $C_1$  and  $nC_{20}$  and aromatics such as xylenes and the methylnaphthalenes are relatively minor compounds. The main input to these siltstones is probably cuticular land plant debris. They have mainly gas and some condensate potential. The one sample of light grey to olive-black claystone has a very similar pyrogram to the brown-grey siltstones and, presumably, has similar organic matter. The brown-black claystone sample which was analysed has a pyrogram very similar to the samples above 2700 m and the same conclusions made for those samples can be applied to this sample.

#### Brent Group (2841 - 2895 m)

Two coal samples were analysed from this sequence. The pyrogram of the sample from 2857 m has a more prominent alkene/alkane homology than the coal from 2866 m. This difference is particularly evident in the higher molecular weight range, i.e. from  $nC_{15}$  to  $nC_{28}$ . This indicates that the upper sample has a larger amount of algal/cuticular material than the lower sample. Other prominent components in both pyrograms include aromatics, such as xylenes, a prominent high molecular weight unresolved hump and an abundance of other compounds, such as cresols and alkyl phenols, in the n-alkane range from  $nC_9$  to  $nC_{12}$ . This type

of kerogen has potential for gas and condensate and possibly minor amounts of waxy oil at higher maturities.

The composite sample of coals from 2854 - 2866 m has a quite different pyrogram to the two coals discussed above, although it covers the same interval. The pyrogram is dominated by the alkene/alkane homology from  $C_1$  to  $nC_{30}$ , aromatics are relatively minor components and there is a prominent unresolved hump. The alkene/alkane pattern is typical of alginites such as Botryococcus and suggests that the coals are rich in this type of algal body. Considerably more cuttings have to be picked for the composite sample than for the thermally extracted samples and this suggests that the alginite pyrogram pattern is more representative of the coals. This type of organic matter has a very rich oil potential at higher maturities than found in this well.

Dunlin Group (2895 - 3223 m)

Drake Formation (2895 - 3071 m)

Seven samples were analysed in this interval, two of which are composite, solvent extracted samples. The pyrograms of the brown-grey siltstones, from 2950 - 3000 m and the brown-grey to brown-black claystones, from 3020 - 3071 m, are all fairly similar, and the pyrograms of the two composite samples, shown in figures 26 and 27, can be used to illustrate the main differences. The alkene/alkane homology is over a slightly greater range ( $C_1$  to  $C_{26}$  compared with  $C_1$  to  $nC_{20}$ ) and the unresolved hump is much more prominent in the claystone. Aromatics, such as xylene and methylnaphthalenes are also more abundant in the claystone. The main organic matter in the siltstone is probably the more resistant higher plant debris such as cuticles, spores etc. and has mainly gas and minor condensate potential. The claystones have potential as

source rocks for gas, condensate and probably light oil and the source of organic matter includes some algal and bacterial organic matter, as well as higher plant debris.

Cook Formation (3071 - 3120 m)

No samples were analysed from this formation.

Amundsen/Burton Formations (3120 - 3223 m)

Seven samples were analysed, one of which was a composite, solvent extracted sample. They consist of brown-grey to brown-black siltstones and claystones. The siltstones tend to have a slighter shorter alkene/alkane homology, smaller unresolved hump and, relatively, less aromatics than the claystones.

Apart from the very prominent n-alkanes, in the range  $nC_{20}$  to  $nC_{30}$  and being slightly richer in aromatics, the claystones are similar to the Drake Fm. claystones and have a similar, but poorer, organic input and source potential. The siltstones resemble the Drake Fm. siltstones and, again, have similar source rock potential to the Drake siltstones.

The abundant n-alkanes from  $nC_{20}$  to  $nC_{30}$  in the claystones, (figure 28) may be due to the presence of migrated hydrocarbons.

Statfjord Formation (3223 - 3472 m)

Five samples were analysed, two coals and three brown-black claystones. Both coals appear to be dominated by polar compounds (e.g. figure 29). This is typical of vitrinitic coal: However, the Rock-Eval data classify the coals as type II, i.e. liptinite-rich. The contradiction cannot be

explained, but it is suspected that coaly additive has been analysed by pyrolysis-gc.

The top claystone sample resembles those from the Amundsen/Burton Fm. and probably represents caved material from that formation. The other two claystones are much richer in aromatic and polar compounds and are typical of claystones deposited in the same environments and with similar organic input, to many coals. They do not have a prominent high molecular weight alkene/alkane component, hence the claystones have mainly gas potential and perhaps, minor condensate potential.

Triassic (3472 - 3550 m, TD)

One dusky brown, green-grey claystone was pyrolysed. The pyrogram shows traces of light hydrocarbons, which indicates that the claystones in this sequence have only poor gas potential.

## VITRINITE REFLECTANCE

The vitrinite reflectance, versus depth, plot is shown in figure 30. Twenty samples were analysed from the interval 1900 m to 3550 m.

Four samples were analysed from the Palaeocene section of the well. All are low in organic matter and contain only a trace of vitrinite. Reflectance values are based on only a small number of readings but, generally, have values of 0.44 % to 0.46 %, increasing slightly with depth. A trace of yellow/orange spores are present in most of the samples.

Two samples were analysed from the Cretaceous (2317 m and 2413 m). The samples are low in organic matter and contain only a small amount of vitrinite. Reflectance values of 0.46% and 0.50% were recorded for the two samples, respectively. In U.V. light traces of liptodetrinite and spores are present and spore fluorescence colour changes from yellow/orange to yellow/orange and light orange.

Two samples were analysed from the Draupne Formation. The upper sample (2485 m) has a calcareous claystone lithology and high bitumen stain and wisps/bands. The phytoclast content is very low and dominantly inertinite. A reflectance value of 0.46 % was obtained which agrees well with the yellow/orange and light orange spore fluorescence colours. The lower sample (2563 m) contains claystone and siltstone lithologies and has variable organic matter content and a reflectance of 0.51 %. In U.V. light, moderate to high amounts of liptodetrinite and bitumen are present.

Three samples were analysed from the Heather Formation (2599 m to 2845 m). The upper sample (2641 m) has a claystone lithology and gives a reflectance of 0.53 %. The sample from 2722 m has a siltstone lithology and a reflectance value of 0.51 %. The lowermost sample (2797 m)

is sandstone and again has a reflectance of 0.51 %. All the samples have moderate to high amounts of bitumen staining and wisps and a moderate amount of phytoclasts which are relatively rich in vitrinite. In U.V. light, moderate to high amounts of liptodetrinite and fluorescing bitumen are present. A low amount of high orange spores are present in all three samples.

The Brent sample (2857 m) has a carbargillite lithology with a high proportion of moderate-sized vitrinite clasts. A rather high reflectance value of 0.66% was obtained for this sample, from 26 readings. In U.V. light, light orange to moderate orange spores are present.

Three samples were analysed from the Dunlin Group (2953 m to 3229 m). The lithologies are mixed, containing claystone, siltstone and sandstone and are moderately rich in organic matter, with high proportions of vitrinite to inertinite. The upper two samples (2986 m and 3061 m) have reflectance values of 0.57% and 0.56% respectively, whereas the lowermost sample (3139 m), which contains carbargillite clasts, has a reflectance of 0.67%. In U.V. light, a moderate to high amount of fluorescing organic matter is present. This includes liptodetrinite, spores, bitumen and occasionally cuticle. Spore fluorescence colours are light orange to moderate orange and in the sample from 3061 m, hydrocarbons pass into the immersion oil.

Four samples were analysed from the Statfjord Formation. All have mixed lithologies, but the upper two (3241 m and 3325 m) contain coal clasts, along with sandstone and claystone clasts. Reflectance values of 0.69% and 0.63% were obtained for the two samples respectively and medium orange to dark orange spores are present in the upper sample. Both samples released hydrocarbons into the immersion oil, making viewing difficult. The lower two Statfjord samples (3397 m and 3463 m) have mixed claystone and sandstone lithologies, the lowermost being partly oxidised. There is a low amount

of bitumen staining and wisps and a low amount of phytoclasts, but a good proportion of vitrinite to inertinite. Reflectance values of 0.69% and 0.63% were obtained for the two samples respectively and, in U.V. light, moderate orange spores were detected.

The Hegre Group sample (3547 m) contains an oxidised coal which had some un-oxidised areas. A reflectance value of 0.70% appears with the moderate to dark orange spore colours observed.

From the depth/reflectance plot (figure 30), a gentle increase can be seen for the top half of the well, which begins to steepen slightly below the Heather Formation. The Brent coal at 2857 m, has an anomalously high reflectance, which does not fit well with the overall gradient. This may be, in part, due to oxidation when drying samples at the well head.

## VISUAL KEROGEN COMPOSITION

Fourteen samples from well NOCS 30/6-5 were analysed in transmitted light. The samples were claystones (6), siltstones (6) and coal (2) and range from 2512 m (Draupne Fm.) to 3373 m (Statfjord Fm.).

Four of the samples were from the Draupne Formation (2512 m, 2533 m, 2545 m and 2581 m). These samples are brown-black or olive-black claystones and siltstones. The kerogen composition is very uniform, with liptinite the dominant component throughout (65 - 75 %). Vitrinite is secondary (15 - 25 %) and inertinite is 10 % throughout. The liptinite component is dominated by spore/pollen material and amorphous material, with minor liptodetrinite. The vitrinite component is mainly amorphous, with some detrital. Semifusinite dominates the inertinite component, with some fusinite and inertodetrinite recognisable in all samples.

Five samples from the Heather Formation were analysed (2617 m, 2665 m, 2677 m, 2734 m and 2764 m). The uppermost four samples are siltstones, the lowermost sample is a claystone. The kerogen composition of the upper two samples and the lowest sample from this interval are very similar to those recorded for the Draupne Fm. samples (60 - 70 % liptinite, 20 - 25 % vitrinite, 10 - 15 % inertinite) and caving must be suspected. The two remaining samples (both siltstones from 2677 m and 2734 m) are somewhat different. Both are dominated by vitrinite (40 % and 50 % respectively) but this is mainly detrital. Liptinite is secondary in these samples (30 %) and is dominating spore/pollen material with some liptodetrinite. The remaining 20 - 30 %, which is in the inertinite maceral group, is mainly semifusinite.

Two Dunlin Group samples were analysed (one from the Drake Formation (3037 m) and one from the Amundsen/Burton Fms. (3127 m)). These samples are very different in kerogen

composition. The Drake Fm. sample has the highest content of liptinites recorded in the well (90 %, dominantly spore/pollen material), with minor detrital inertinite and vitrinite. The Amundsen/Burton Fms. sample has 50 % vitrinite (mainly amorphous), 30 % liptinite (mainly spore/pollen with some detrital and amorphous) and 20 % inertinite (mainly semifusinite).

The three Statfjord Fm. samples (coals from 3241 m and 3325 m, and a claystone from 3373 m), are dominated by vitrinite. The coals both contain 90 % vitrinite with 5 % each of inertinite and liptinite. The claystone contains 70 % vitrinite (mainly amorphous) and 15 % each of inertinite (detrital) and liptinite (spore/pollen material).

As can be seen from figure 31, the data are quite scattered. The Statfjord Fm. samples would be classified as favourable for gas generation. Two of the Heather Fm. siltstones (2672 m and 2734 m) and the Amundsen/Burton Fms. claystone could be classified as favourable for mixed to gas products. The rest of the samples are favourable for generation of mixed to oil products.

## CONCLUSIONS

Based on the various analyses undertaken on samples from this well, the following preliminary conclusions were made:

### 1. Source Rock Potential

Viking Group (2452 - 2841 m)

Draupne Formation (2452 - 2593 m)

The interval consists mainly of brown-black claystones grading to siltstones below 2500 m. The TOC content of these claystones varies from 4.7% to 7.7% and the average TOC is 5.7%. Petroleum potentials vary from 23 - 47 with an average of 29. There is no apparent difference between the siltstones and claystones, using screening data. Visual kerogen composition is similar for samples above and below 2500 m and is uniformly rich in liptinites. Pyrolysis gas chromatography indicates that the samples contain type II kerogen throughout the sequence and the sequence above 2500 m is probably algal-rich. Hydrocarbon analysis shows that the samples above 2500 m contain greater amounts of light hydrocarbons (less than  $nC_{15}$ ) and heavy hydrocarbons (greater than  $nC_{20}$ ) than the samples below 2500 m. The whole interval has a rich potential as a source rock for oil and gas.

Heather Formation (2593 - 2841 m)

The best source rock interval in this formation is from 2593 m to 2700 m. This interval consists mainly of brown-black siltstones with 3.5% to 5.1% TOC (average 4.5%) and

petroleum potentials from 12 - 22 (average 16). Kerogen is type II/III and the pyrograms indicate that the siltstones have oil and gas potential, but will probably produce a lighter oil. Below 2700 m, the siltstones which make up most of the sequence are brown-grey in colour and have TOC contents ranging from 0.8 % to 1.5 % and petroleum potentials from 1-5. Kerogen is mainly type III and the sequence has a fair potential for gas and some condensate (based on the pyrogram patterns).

#### Brent Group (2841 - 2895 m)

The sequence consists mainly of sandstones and some minor coals and claystones. The coals appear to be liptinite-rich (based on pyrogram patterns), in part, and have a rich potential as source rocks for gas, condensate and some waxy oil.

#### Dunlin Group (2895 - 3223 m)

#### Drake Formation (2895 - 3071 m)

There are two main claystone/siltstone sequences. These are 2950 - 3000 m and 3020 - 3071 m, approximately. The top section consists mainly of brown-grey siltstones with 1.3% to 1.8% TOC and petroleum potentials from 2-3. Pyrolysis data indicates that they have type III kerogen, with gas and minor condensate potential. The brown-grey to brown-black claystones below 3020 m, have an average TOC content of about 1.9% and petroleum potential of 9. The kerogen is type II based on Rock-Eval data. Pyrograms indicate some oil potential. The claystones have a good potential for light oil, condensate and gas.

Cook Formation (3071 - 3120 m, approx.)

Consists mainly of sandstones, minor siltstones and claystones which probably have similar characteristics to the Drake samples but were not analysed, since the claystones in this section were considered to be mostly caved.

Amundsen/Burton Formations (3120 - 3223 m)

Consists mainly of sandstones, with some interbedded siltstones and claystones. The TOC of the brown-grey to brown-black claystones varies from 0.8 % to 2.4 % and petroleum potentials vary from 2-6. Kerogen is mainly type III. The pyrograms indicate that the claystones and siltstones have liquid hydrocarbon potential. The claystones/siltstones in this sequence have a fair gas and condensate potential.

Statfjord Formation (3223 - 3472 m)

Consists mainly of sandstones. Minor coals and claystones have mainly gas potential.

Triassic (3472 - 3550 m, TD)

Consists mainly of sandstones and barren dusky-brown and green-grey claystones with no source rock potential.

## 2. Generation and Migration

Oil shows were observed in Brent group sandstones. The presence of migrated hydrocarbons is indicated for the Dunlin and Heather siltstones and for claystones directly

above and below these sandstones and possibly for the Draupne siltstones on the basis of Rock-Eval and gc data. Diesel contamination may have affected the samples in the Statfjord Fm. and in the Triassic.

### 3. Maturity

The maturity trend of the Jurassic interval in this well is based on optical and chemical data, which is considered to be good quality. It is considered that the Jurassic is immature at the top of the Jurassic and early mature within the Dunlin sequence. At the base of the Jurassic the sequence is within the oil window (i.e. 0.45 % to 0.7 % Ro), but probably has not reached peak oil generation for marine type II kerogens.

Figure 1. NOCS 30/6-5 (FIND)

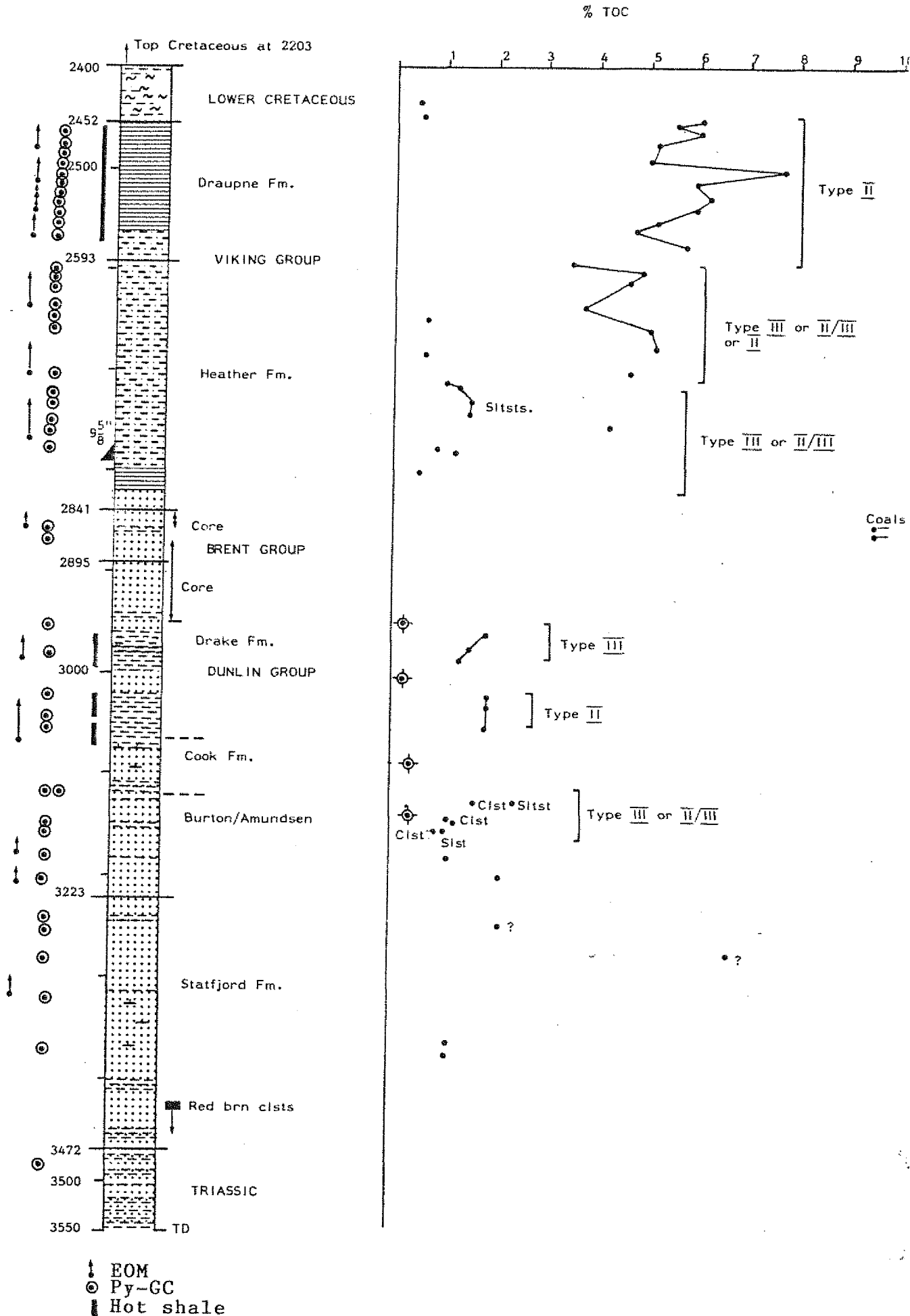


Figure 2. Production Index vs Depth for Well no. 30/6-5

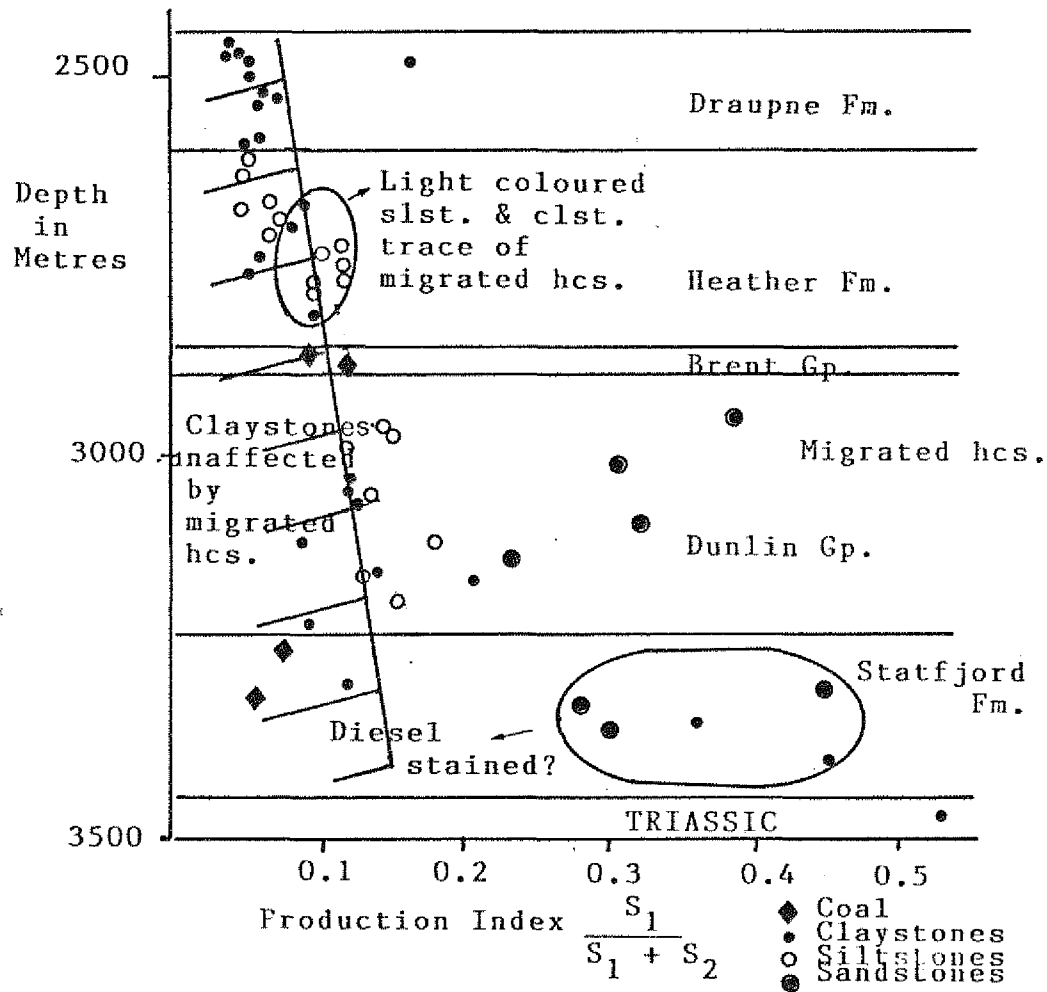
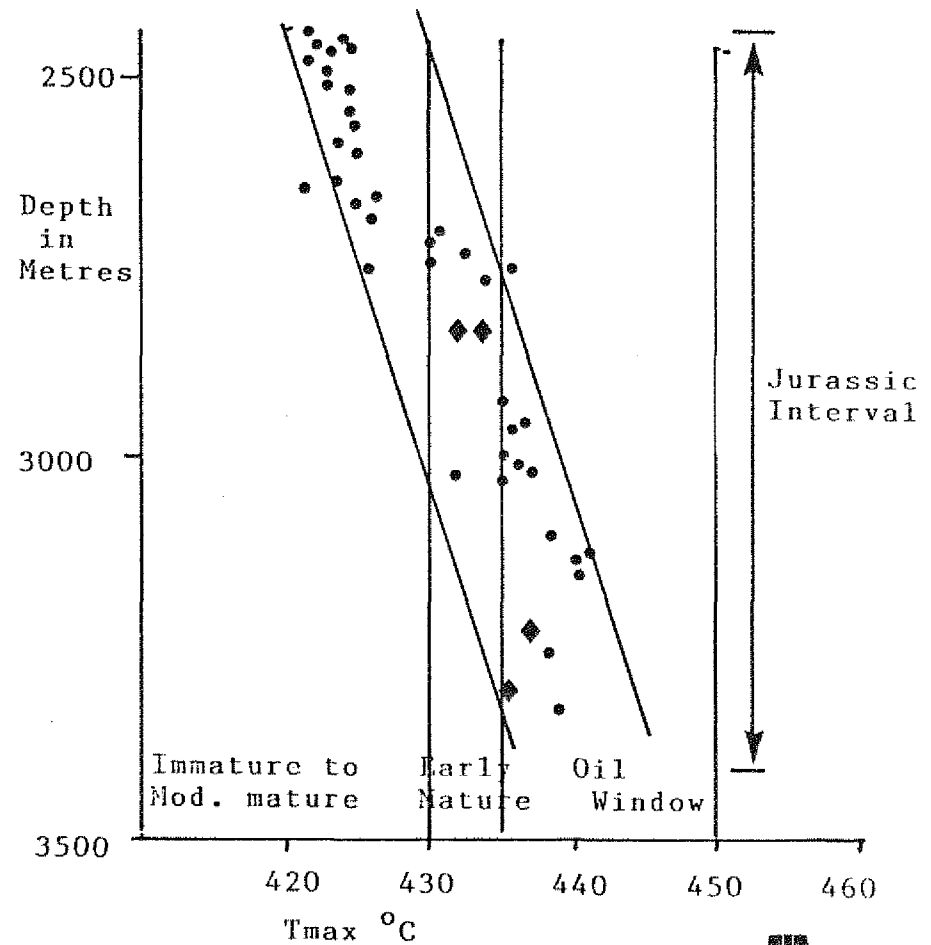


Figure 3. Tmax vs Depth for Well no. 30/6-5.



Analysis S15320509

4, 6, 1

2458-70m, 30/6-5, SAT

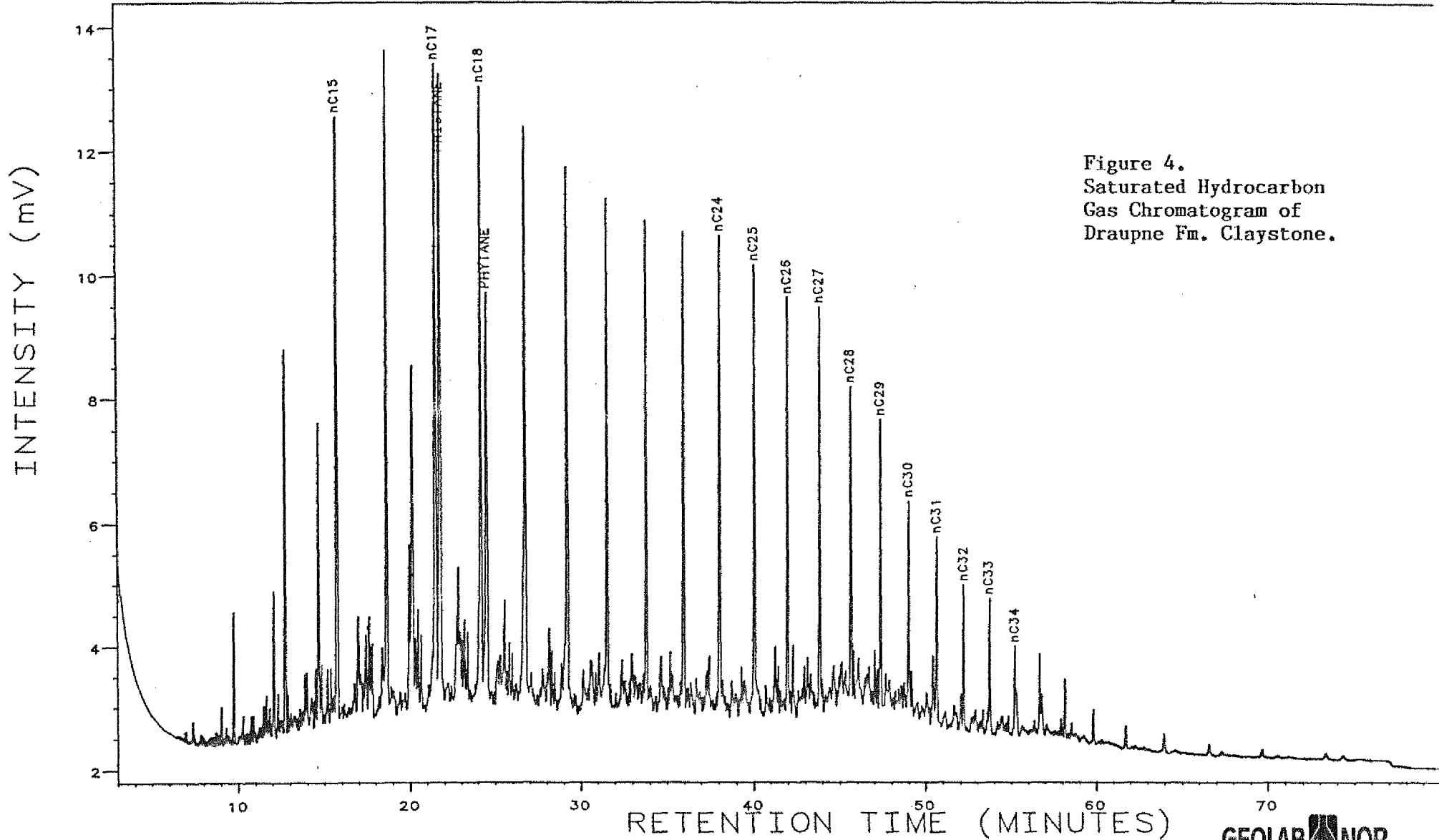


Figure 4.  
Saturated Hydrocarbon  
Gas Chromatogram of  
Draupne Fm. Claystone.

Analysis S15320509

4, 9, 1

2545-47m, 30/6-5, SAT

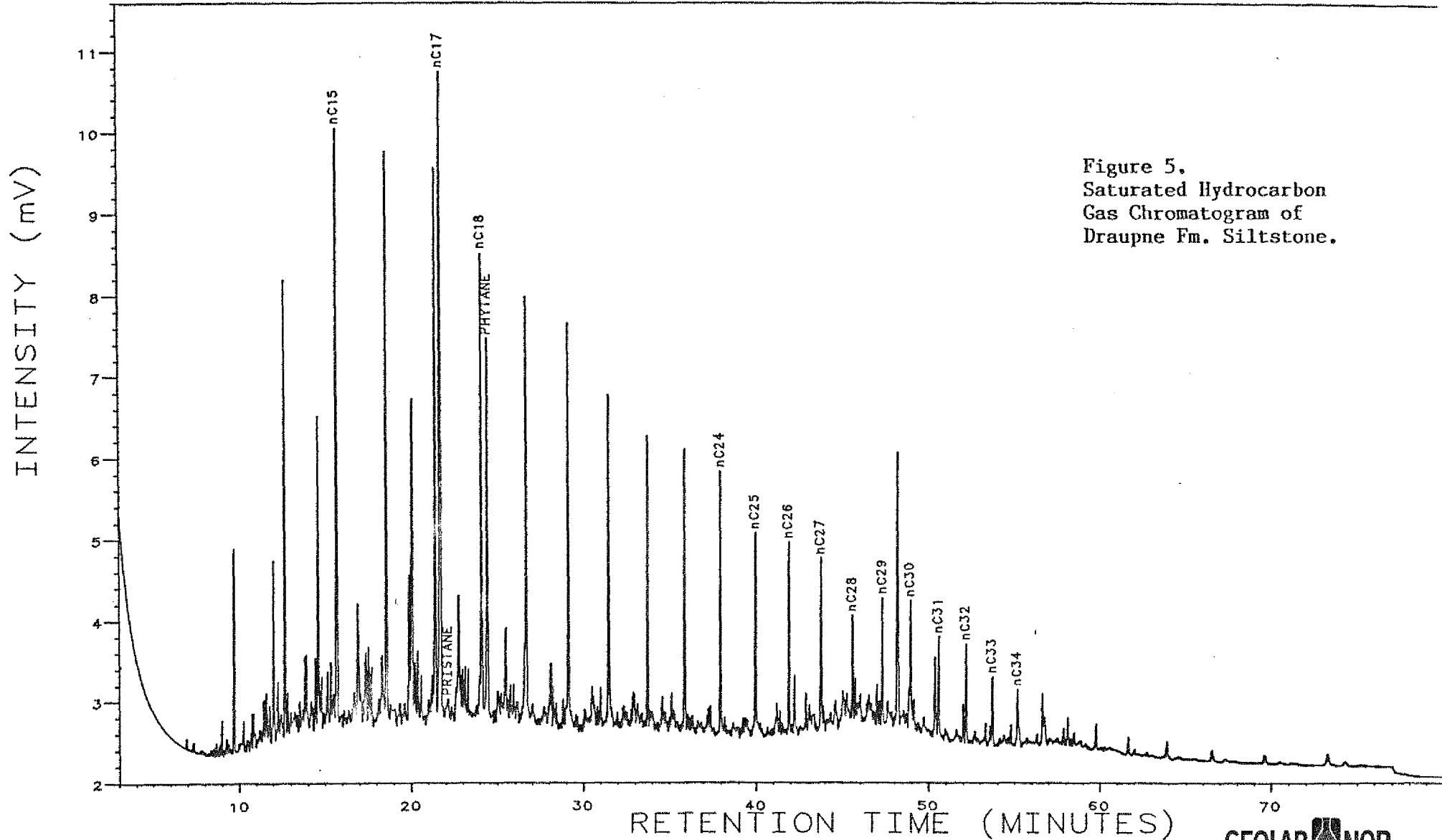


Figure 5.  
Saturated Hydrocarbon  
Gas Chromatogram of  
Draupne Fm. Siltstone.

Analysis S15320509

4, 11, 1

2563-81m, 30/6-5, SAT

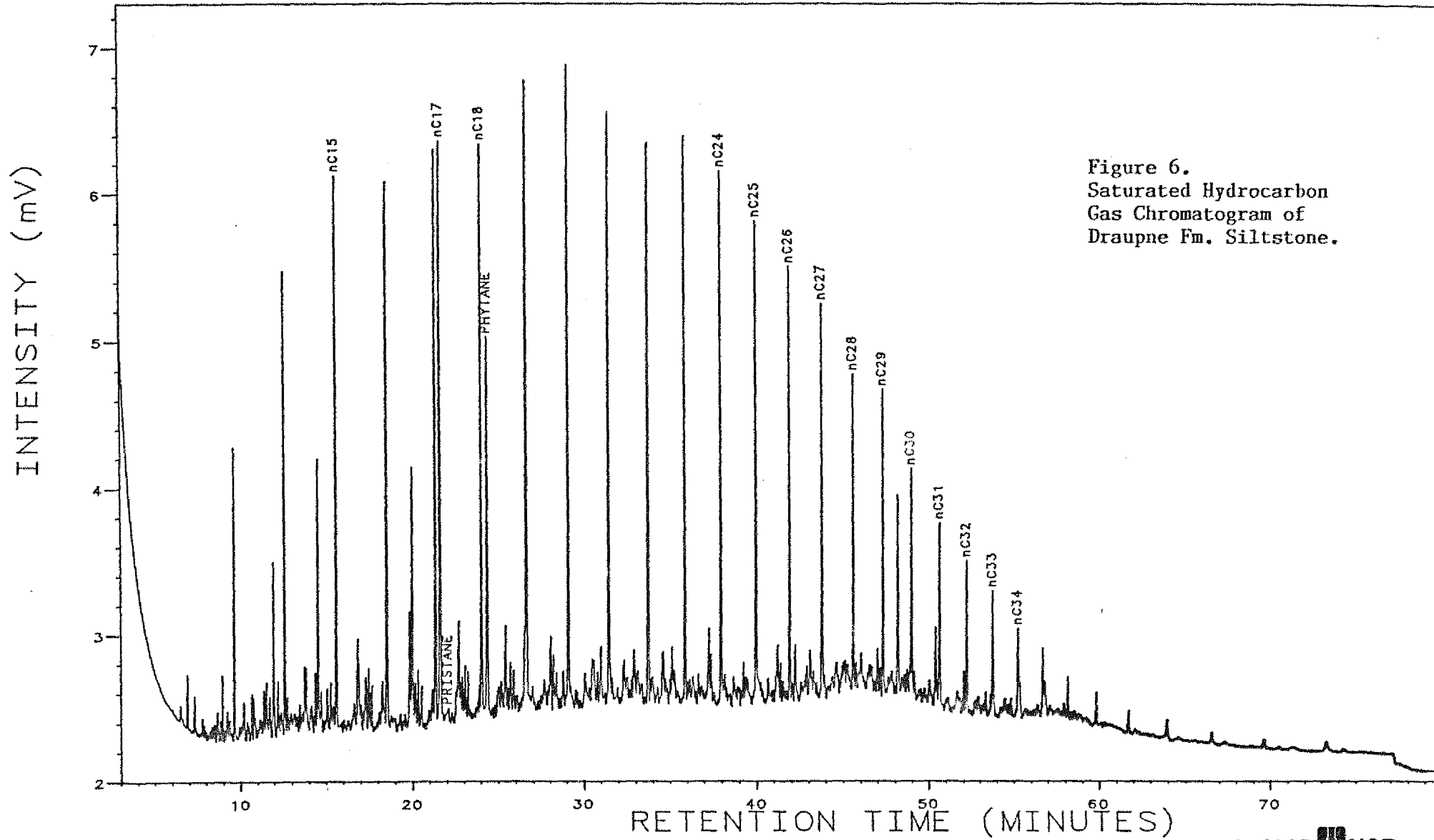


Figure 6.  
Saturated Hydrocarbon  
Gas Chromatogram of  
Draupne Fm. Siltstone.

Analysis S15320509

4, 1, 1

2713-85 m, 30/6-5, SAT

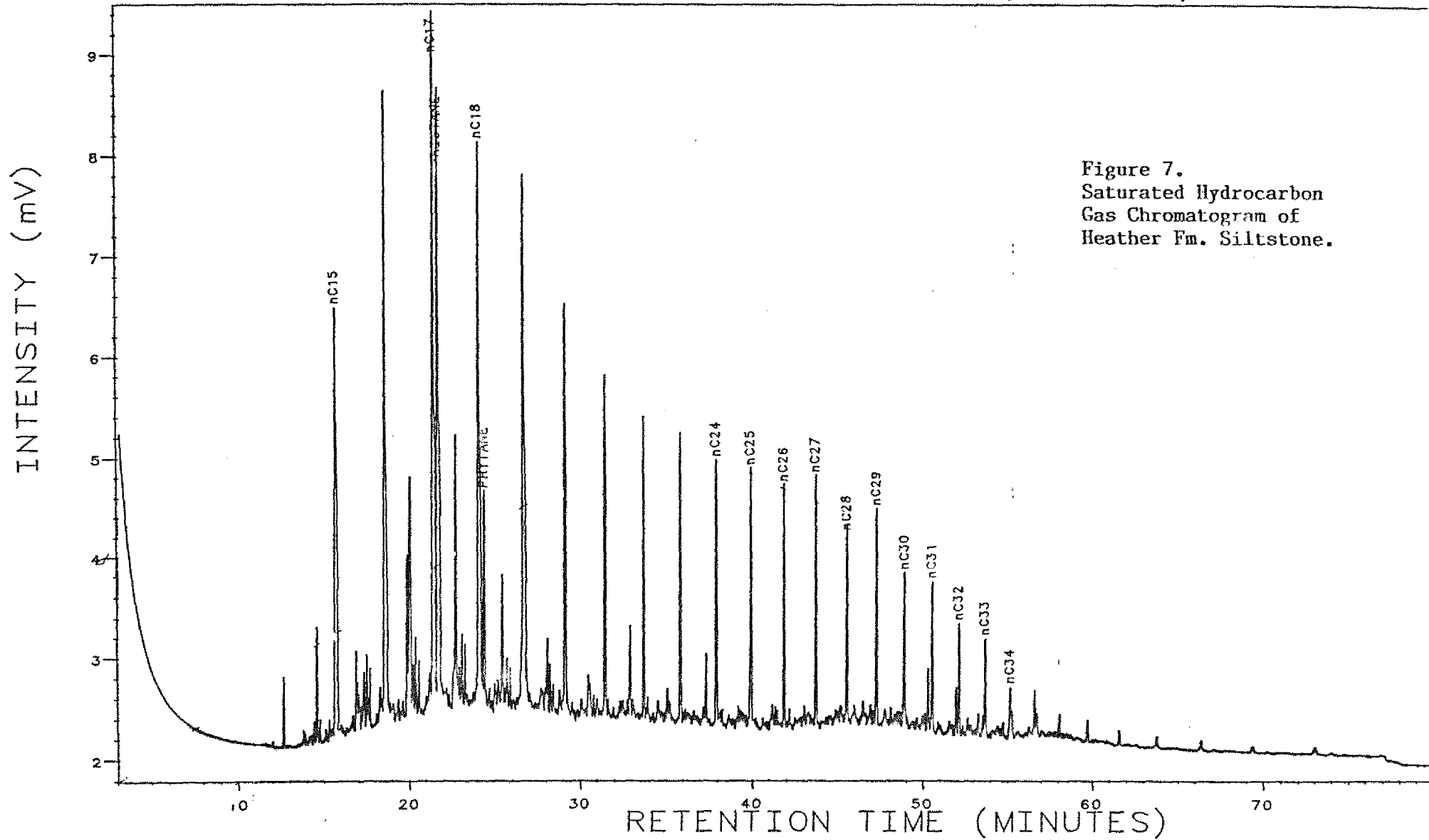


Figure 7.  
Saturated Hydrocarbon  
Gas Chromatogram of  
Heather Fm. Siltstone.

Analysis S15320509

4, 2, 1

2857-66.m, 30/6-5, SAT

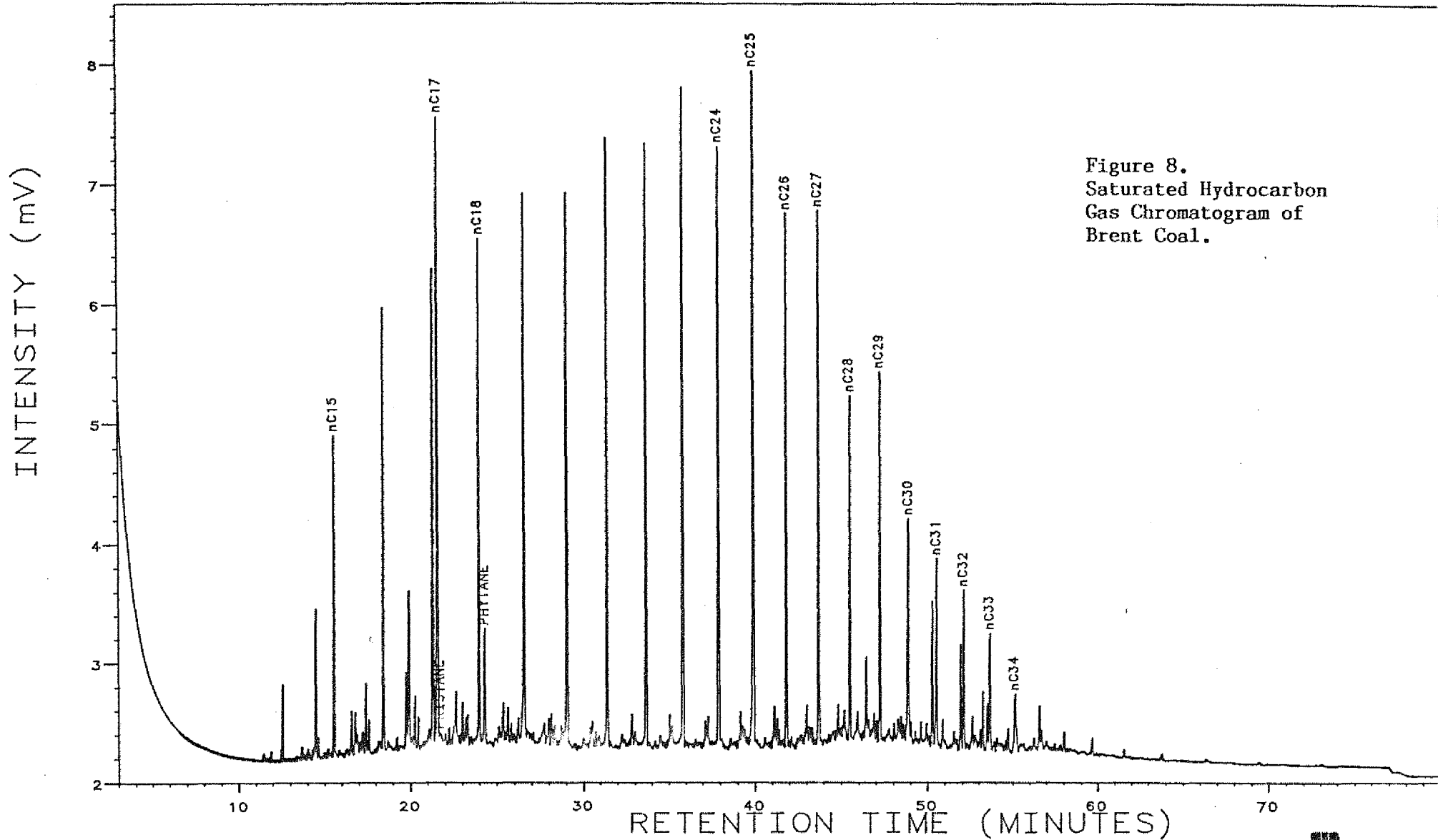


Figure 8.  
Saturated Hydrocarbon  
Gas Chromatogram of  
Brent Coal.

Analysis S15320509

4, 4, 1

3025 - 61m, 30/6-5, SAT

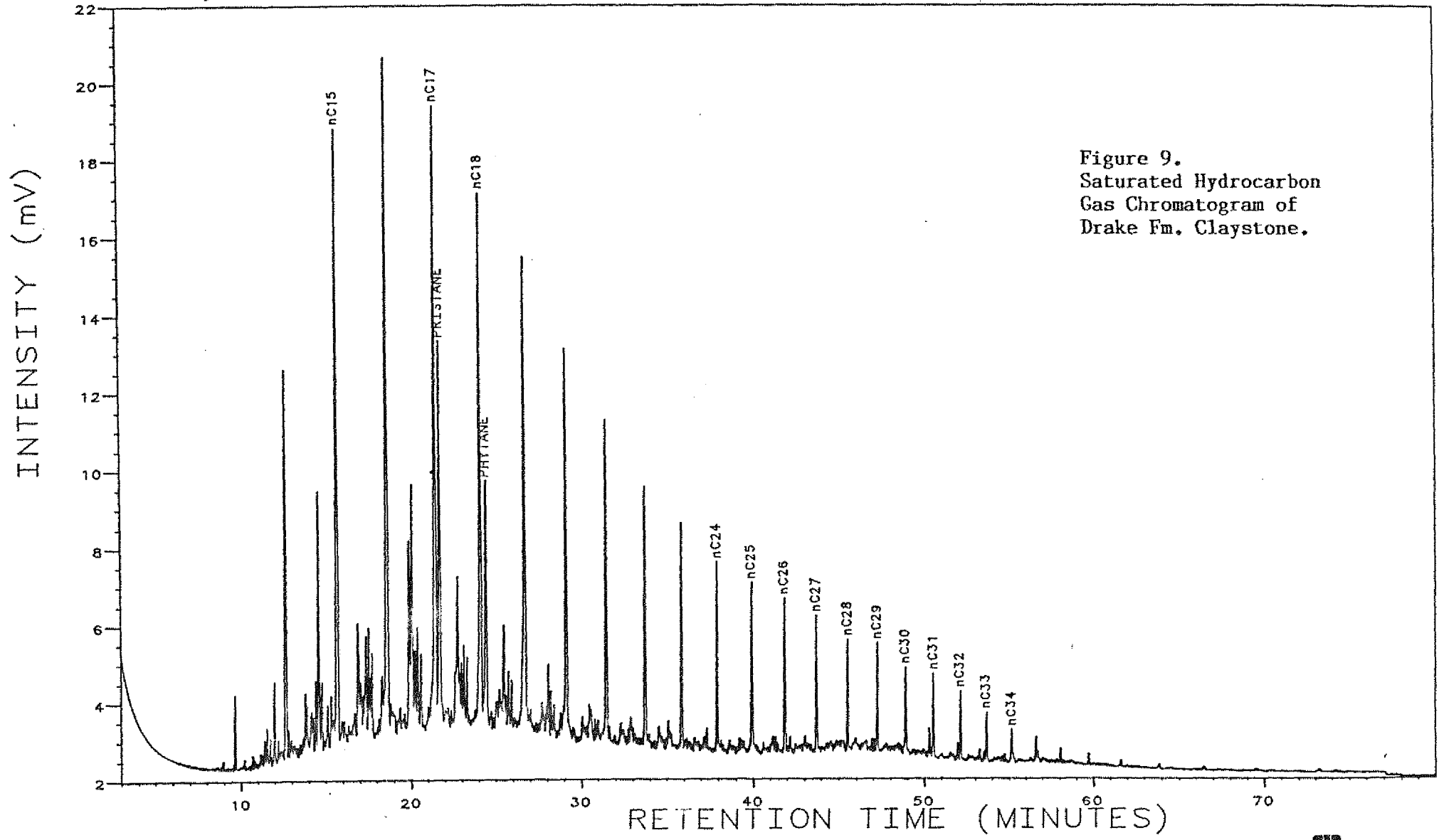


Figure 9.  
Saturated Hydrocarbon  
Gas Chromatogram of  
Drake Fm. Claystone.

Analysis S15320509

4, 5, 1

3127-3205 m, 30/6-5, SAT

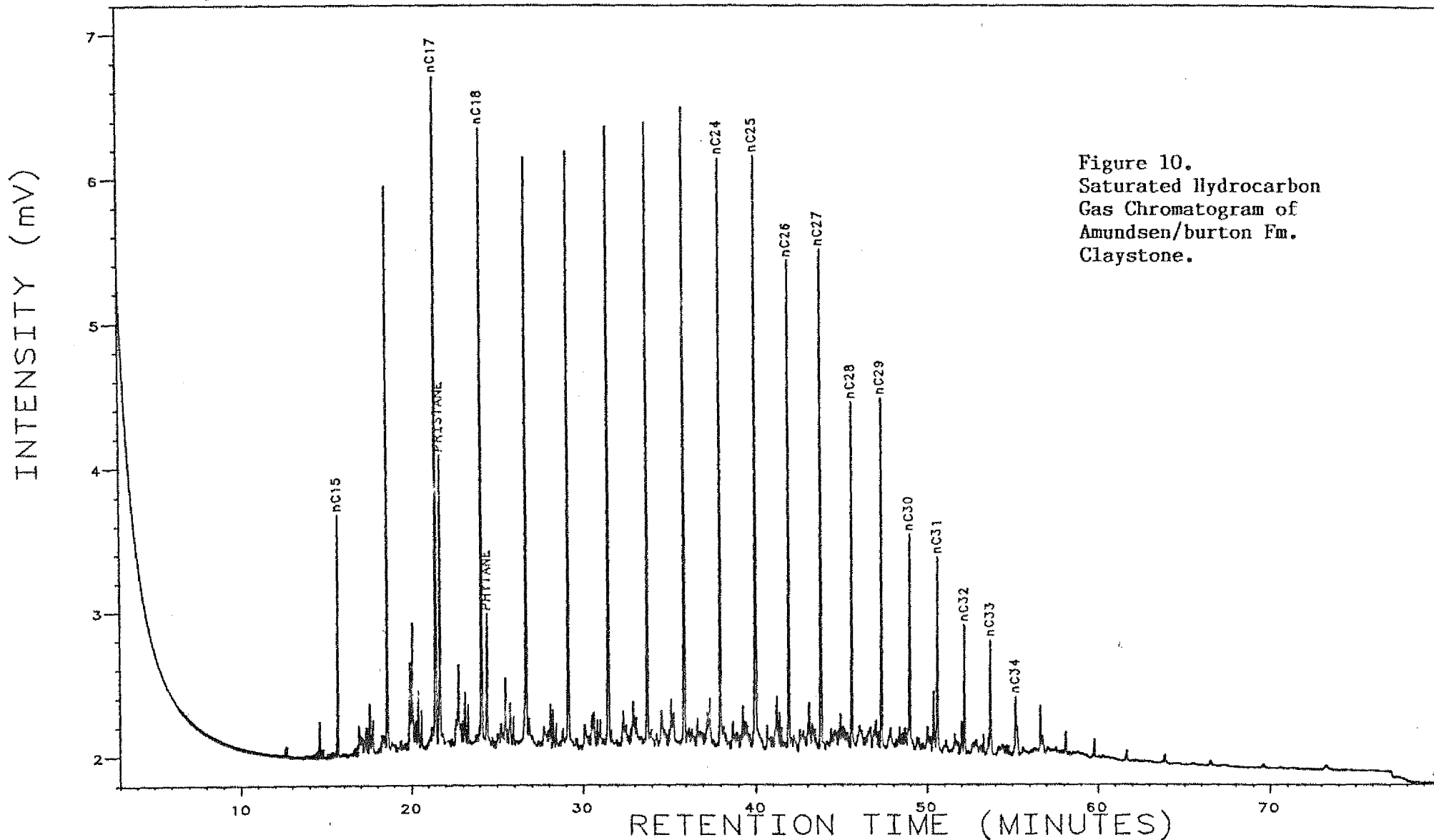


Figure 10.  
Saturated Hydrocarbon  
Gas Chromatogram of  
Amundsen/burton Fm.  
Claystone.

Analysis 2458 8, 1, 1 30/6-5, 2458-70m, ARO

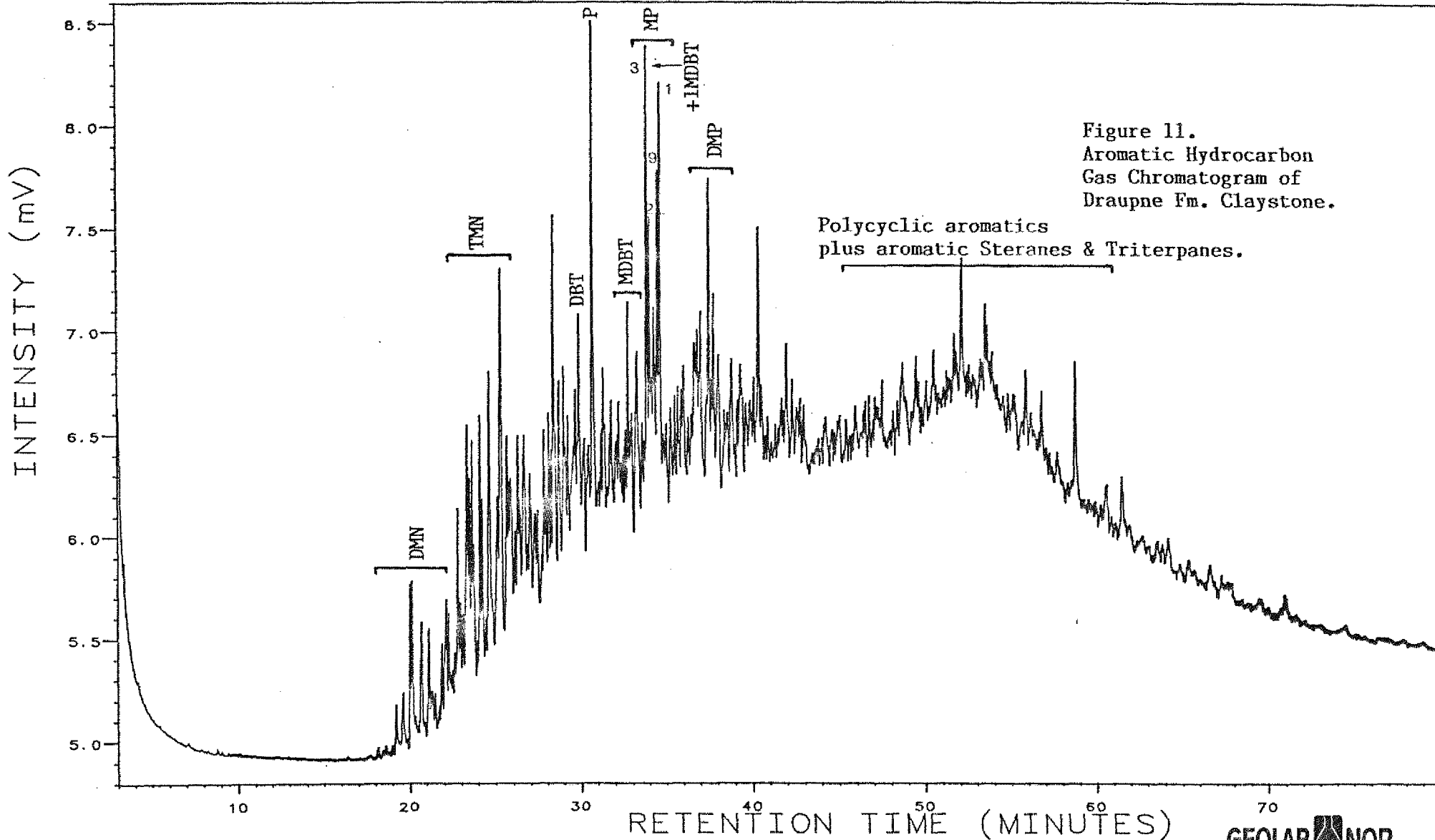


Figure 11.  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Draupne Fm. Claystone.

Polycyclic aromatics  
plus aromatic Steranes & Triterpanes.

Analysis 2458 9, 1, 1 30/6-5, 2458-70 m, ARO

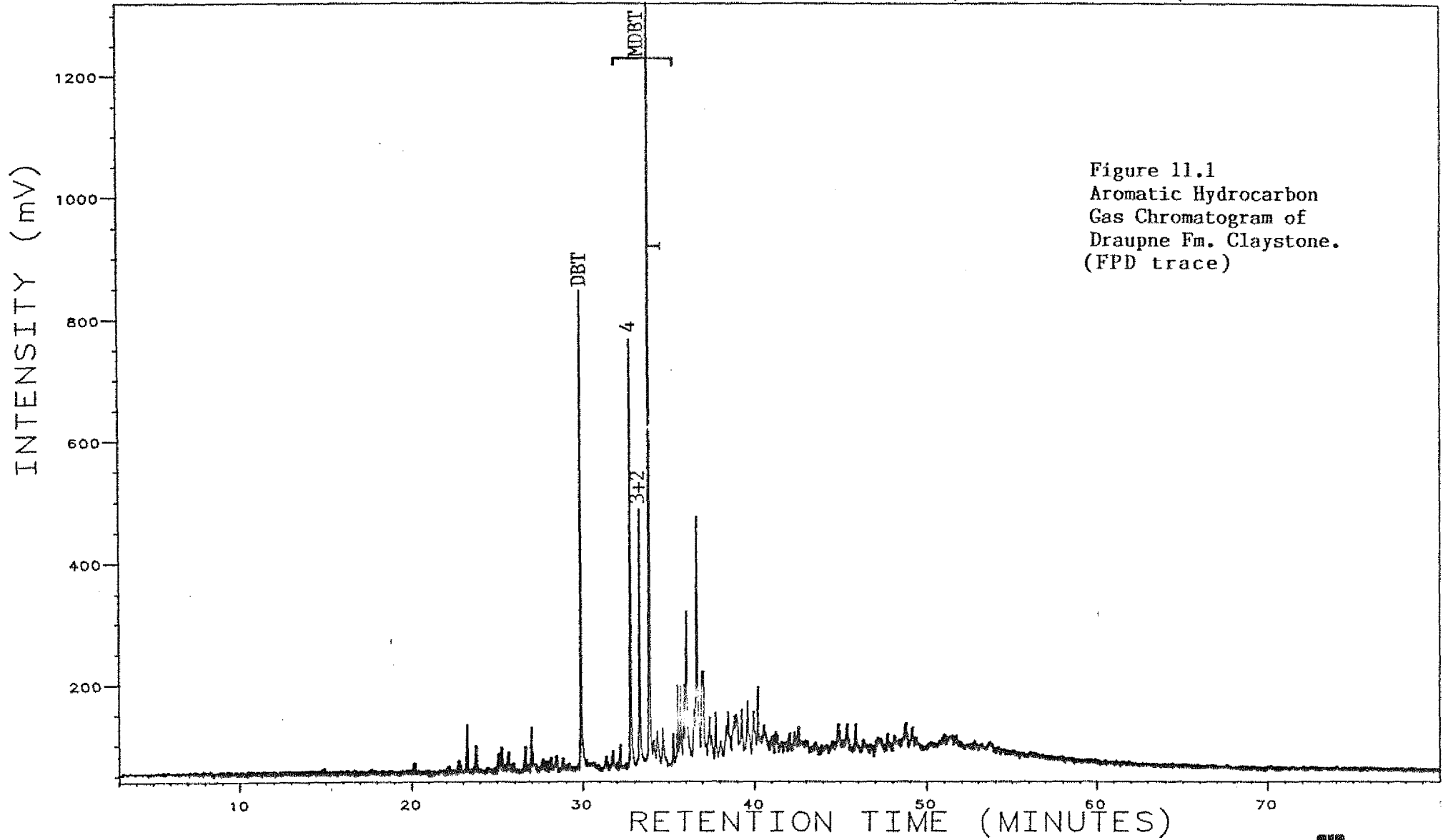


Figure 11.1  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Draupne Fm. Claystone.  
(FPD trace)

Analysis

2545

8, 1, 1

30/6-5, 2545-47m, ARO

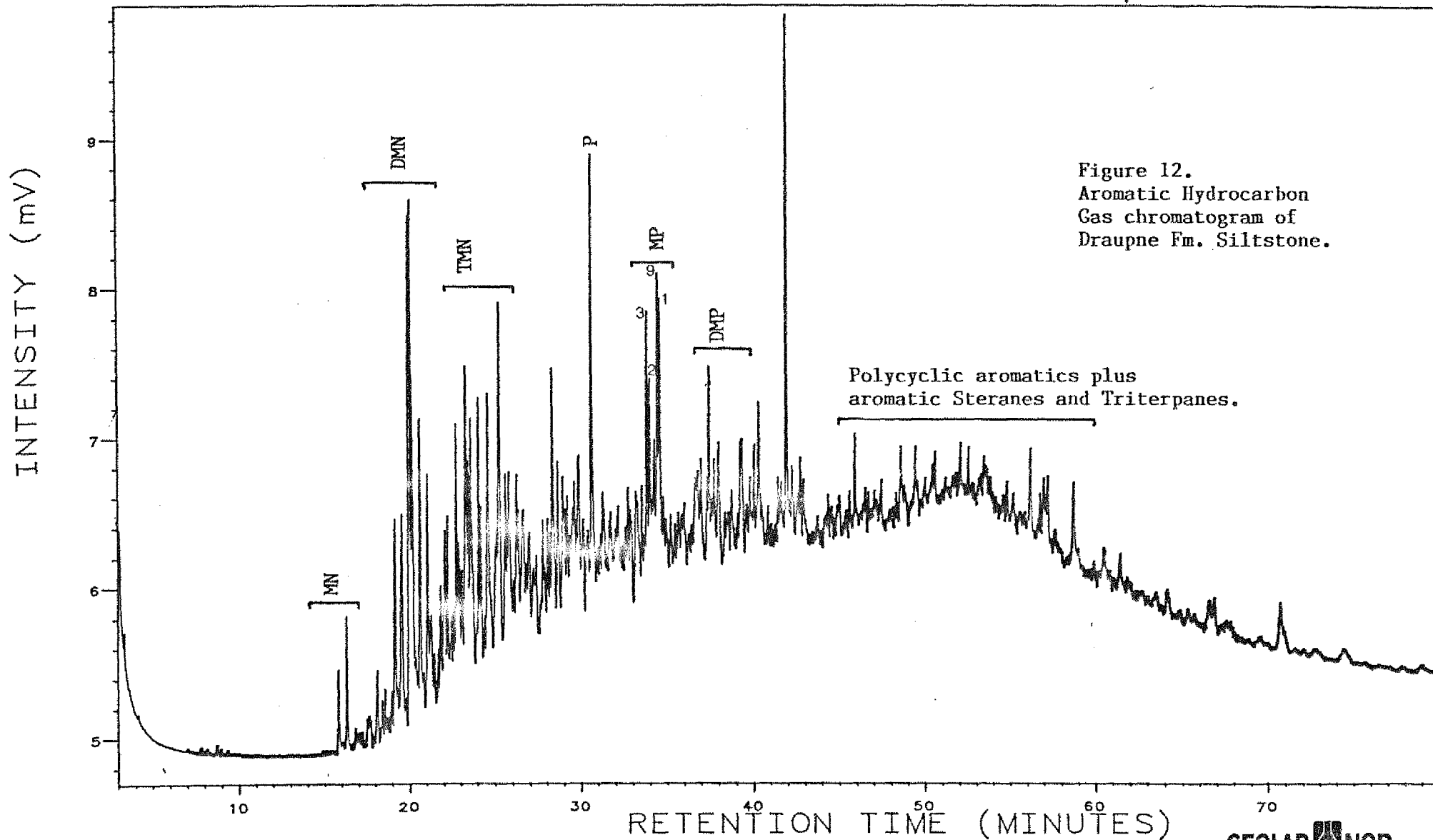


Figure 12.  
Aromatic Hydrocarbon  
Gas chromatogram of  
Draupne Fm. Siltstone.

Polycyclic aromatics plus  
aromatic Steranes and Triterpanes.

Analysis

2713

8, 1, 1 30/6-5, 2717-85m, ARO

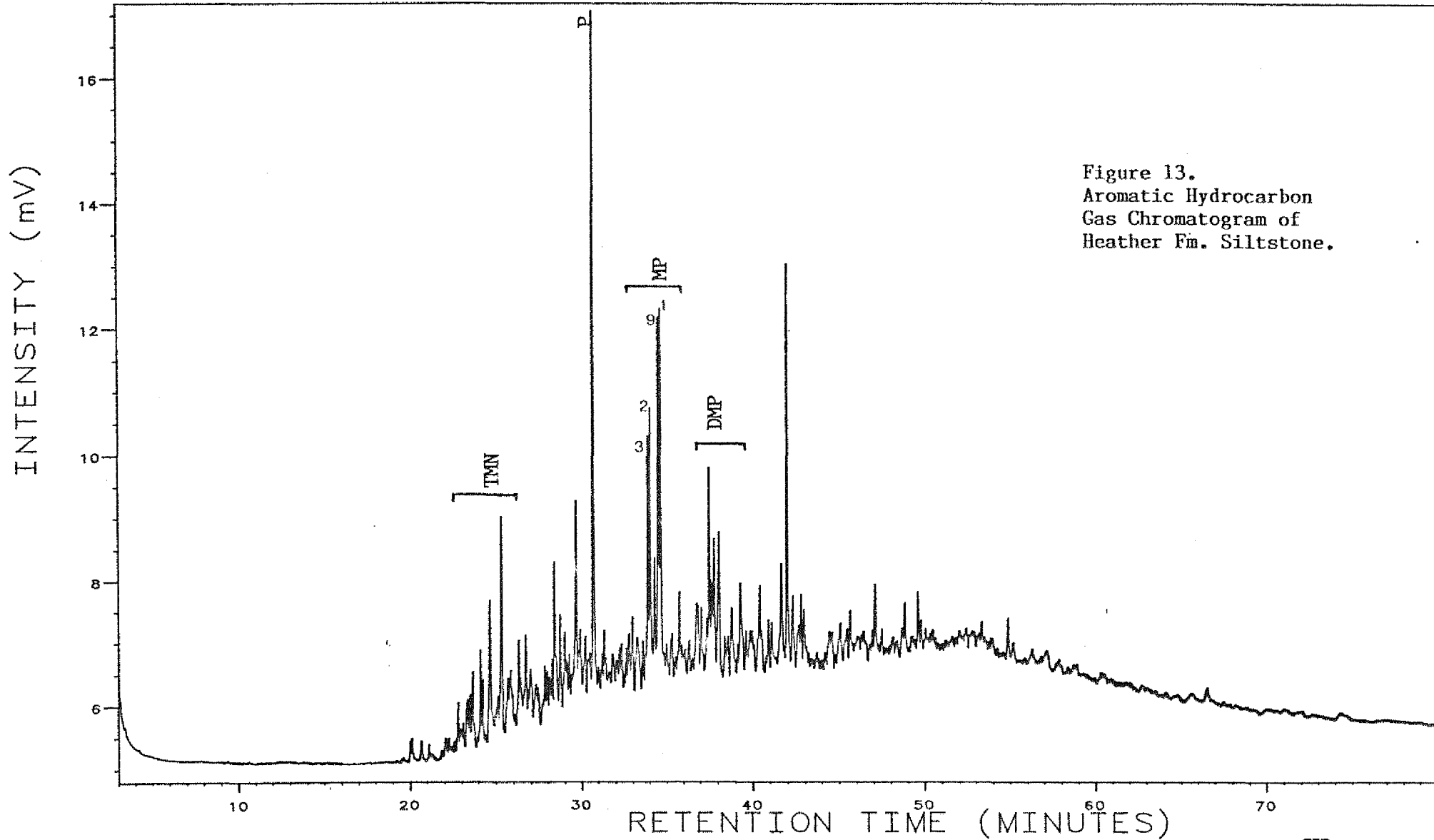


Figure 13.  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Heather Fm. Siltstone.

Analysis 2713 9, 1, 1 30/6-5, 2713-85m, ARO

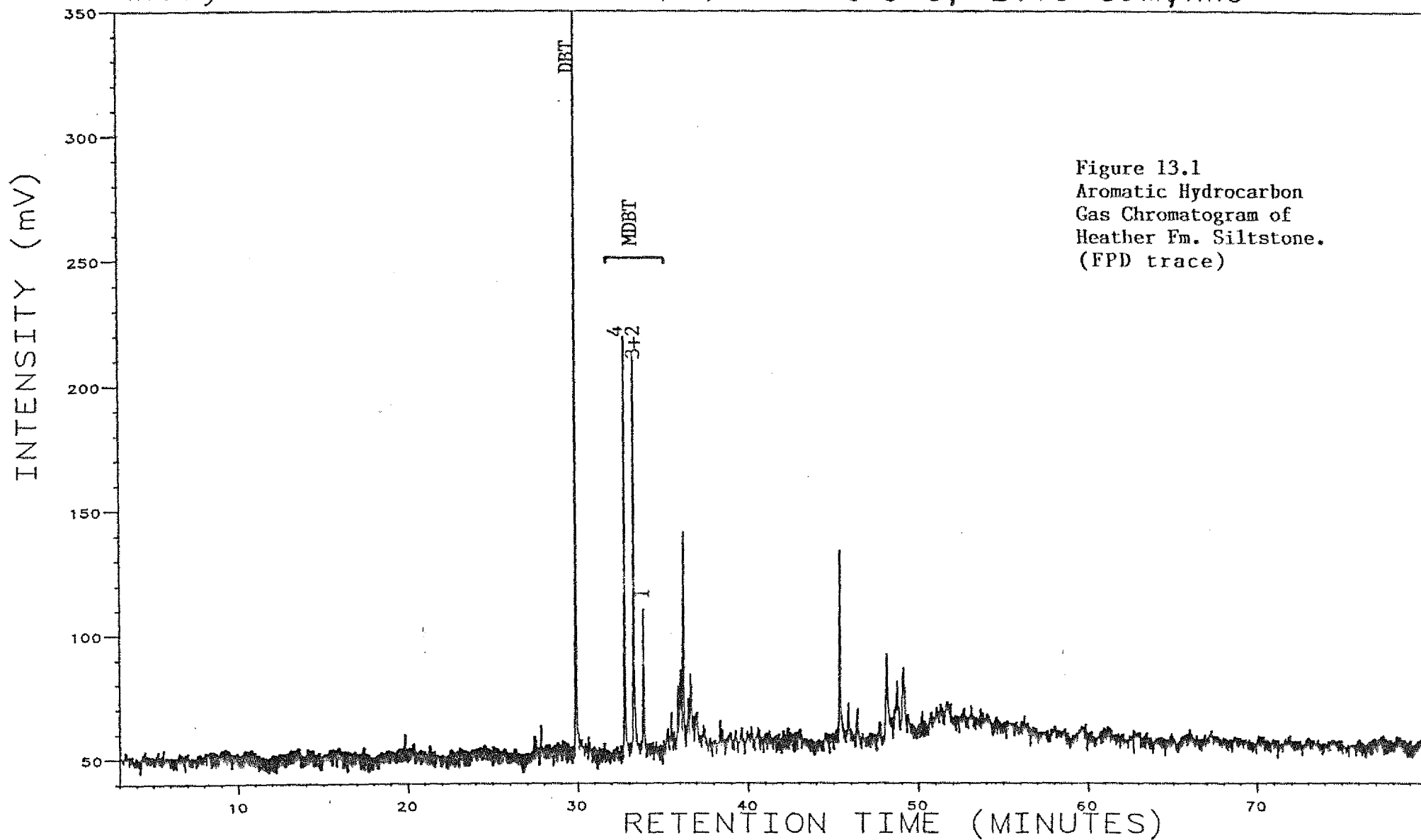


Figure 13.1  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Heather Em. Siltstone.  
(FPD trace)

Analysis 2857 8, 1, 1 30/6-5, 2857-66 m, ARO

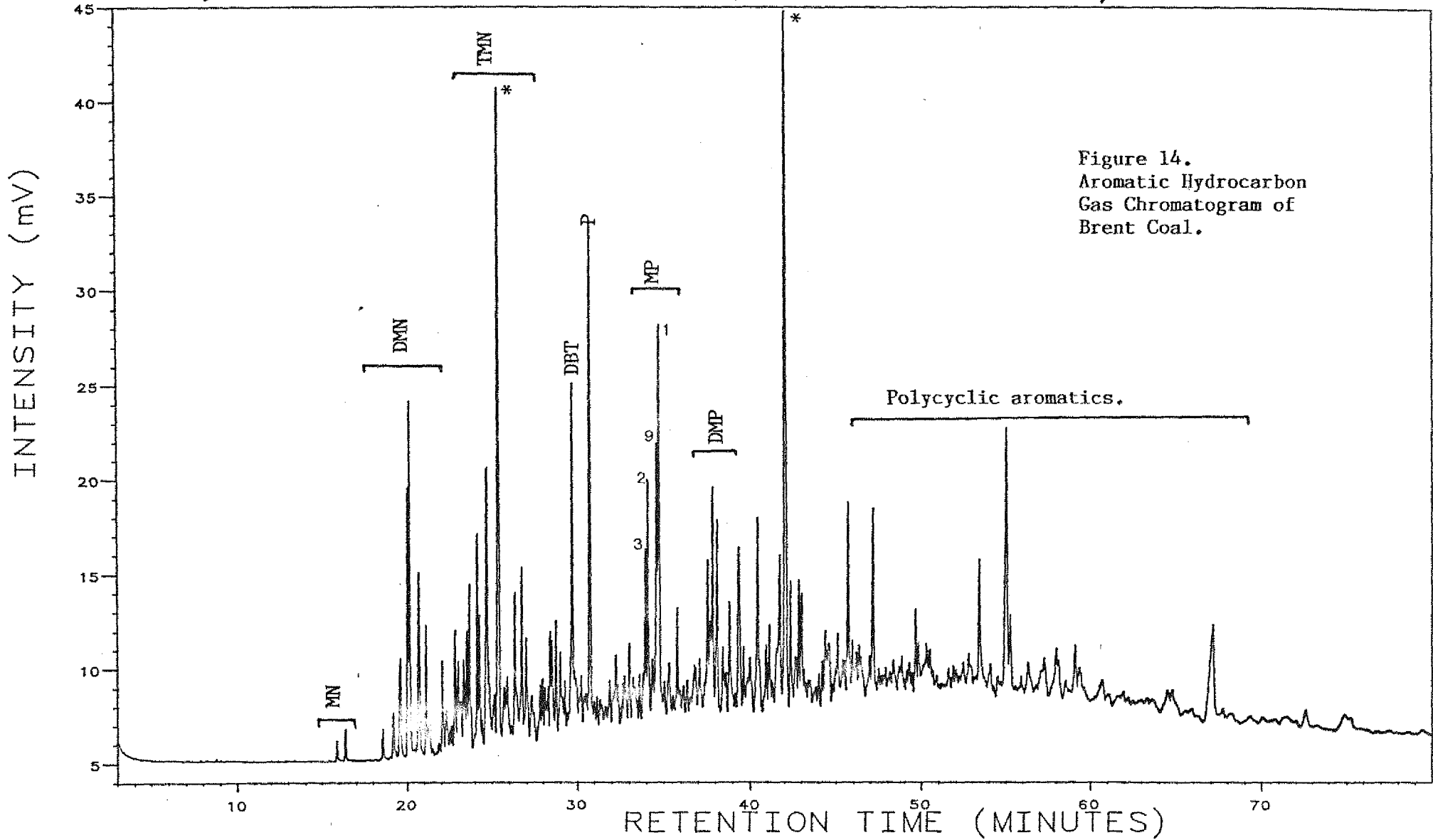


Figure 14.  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Brent Coal.

Analysis

2857

9, 1, 1 30/6-5, 2857-66m, ARO

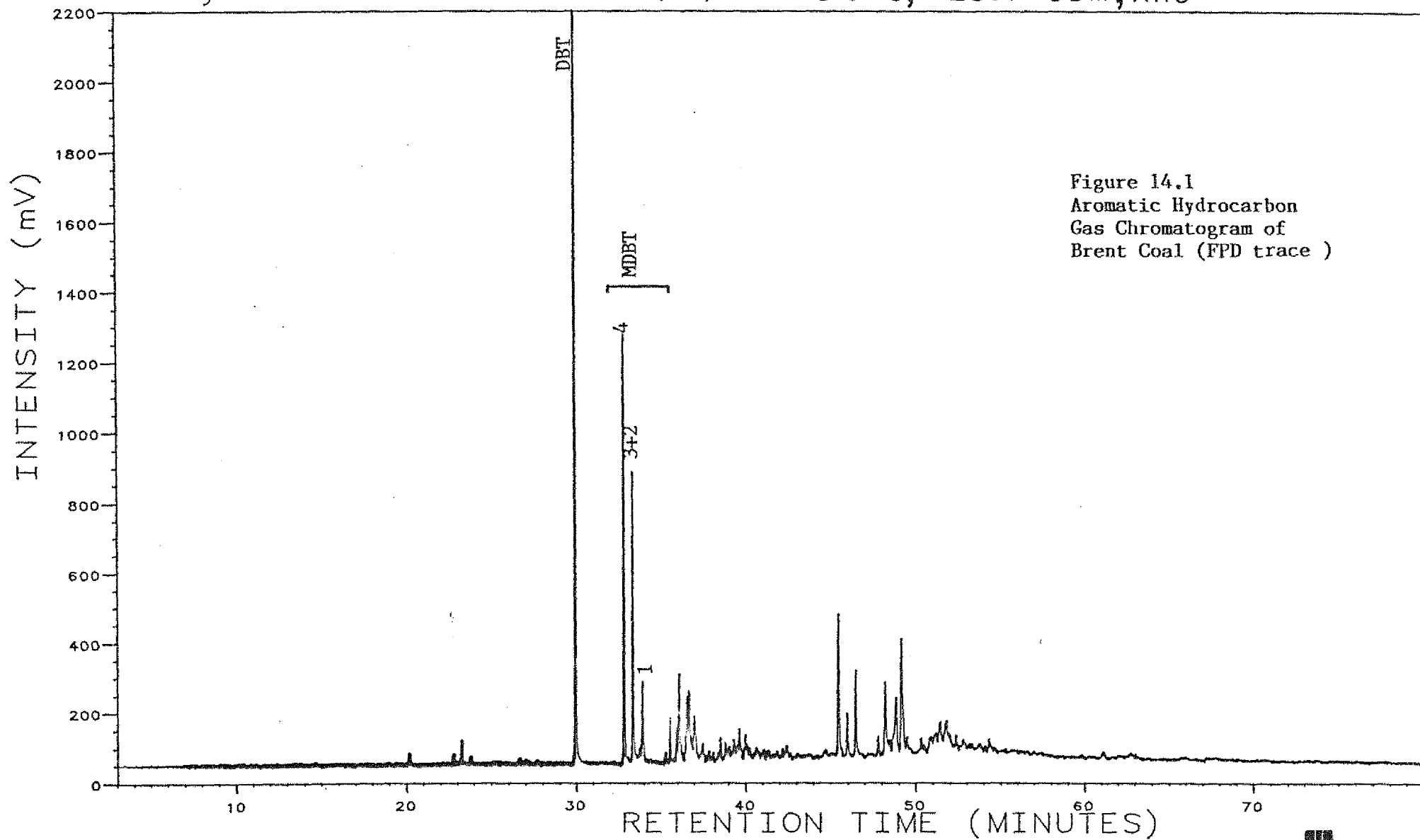


Figure 14.1  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Brent Coal (FPD trace )

Analysis

3025

8, 1, 1 30/6-5, 3025-61m, ARO

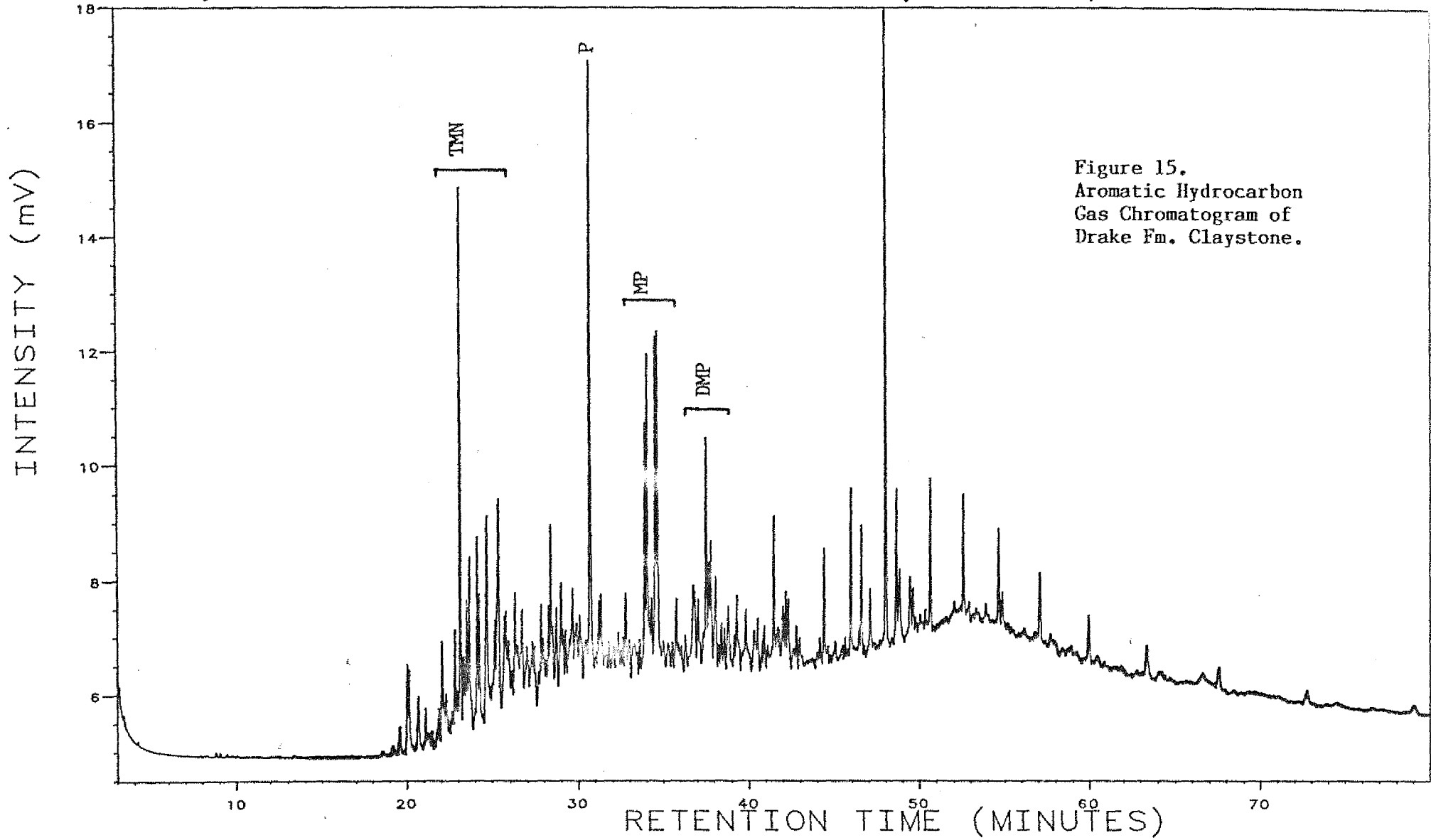


Figure 15.  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Drake Fm. Claystone.

Analysis

3025

9, 1, 1

30/6-5, 3025-61m, ARO

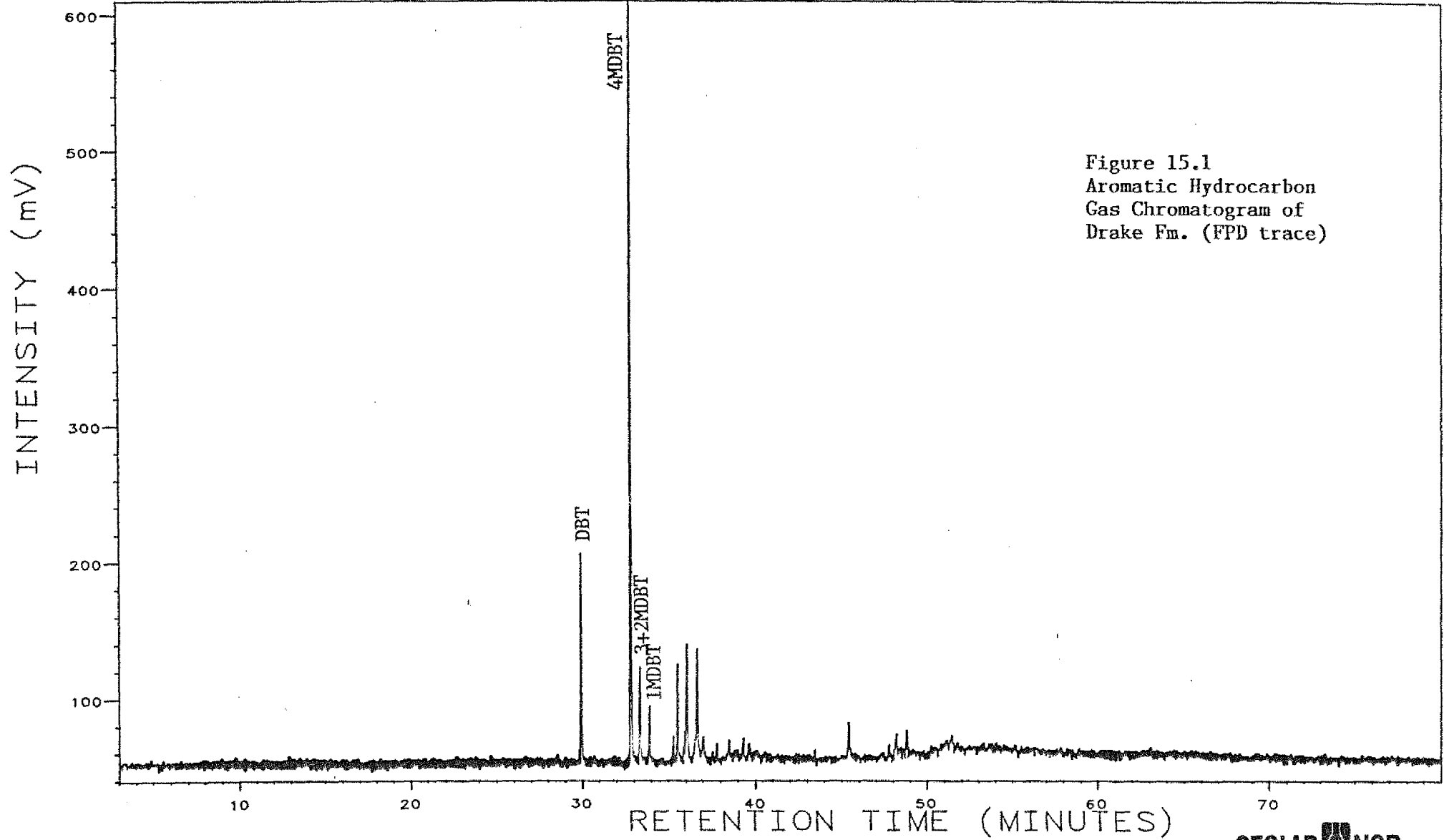


Figure 15.1  
Aromatic Hydrocarbon  
Gas Chromatogram of  
Drake Fm. (FPD trace)

Analysis T21532470

24, 1, 1

30/6-5, 2470m, S1

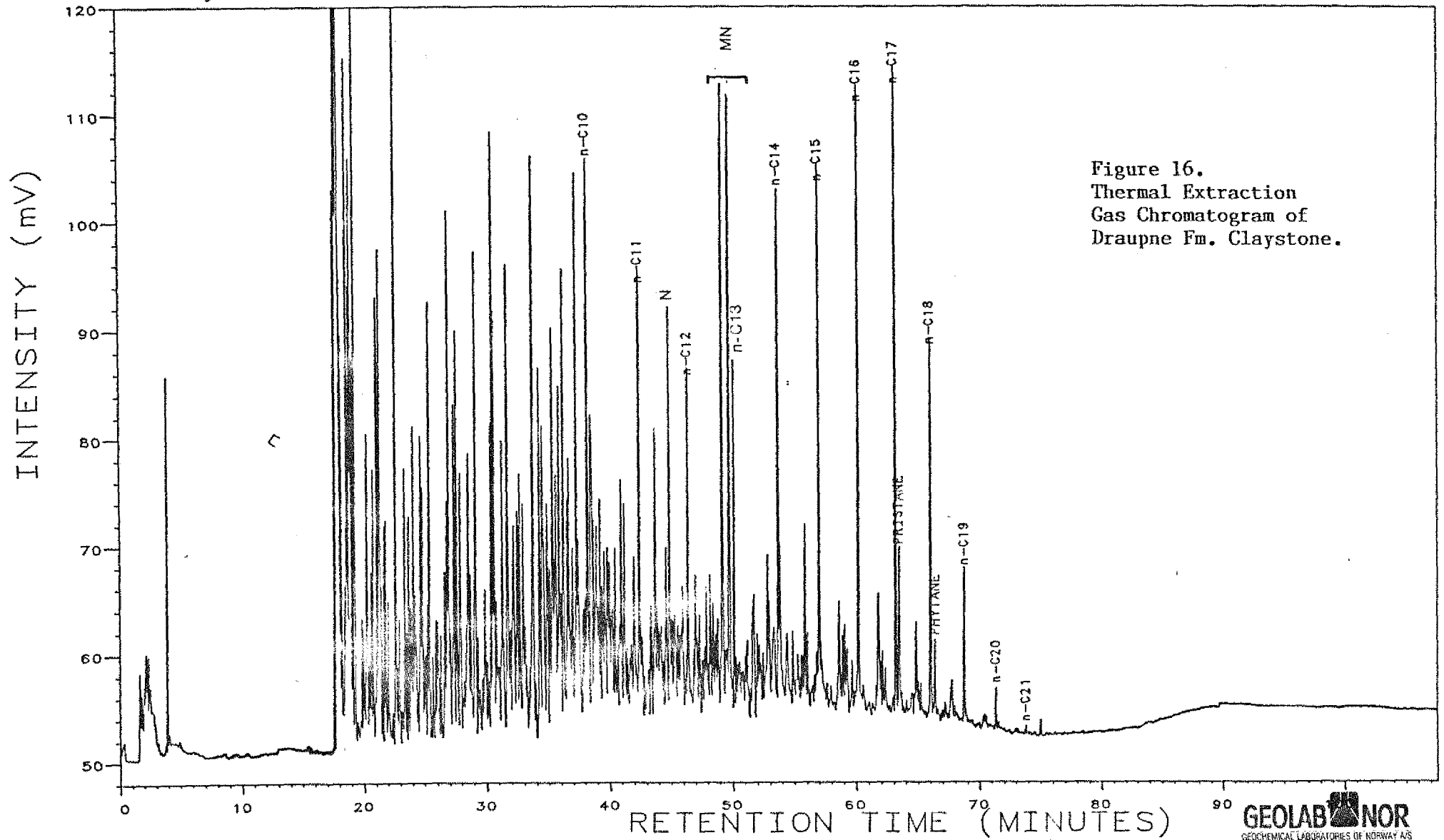


Figure 16.  
Thermal Extraction  
Gas Chromatogram of  
Draupne Fm. Claystone.

Analysis T21532521

24, 1, 1

30/6-5, 2521m, S1

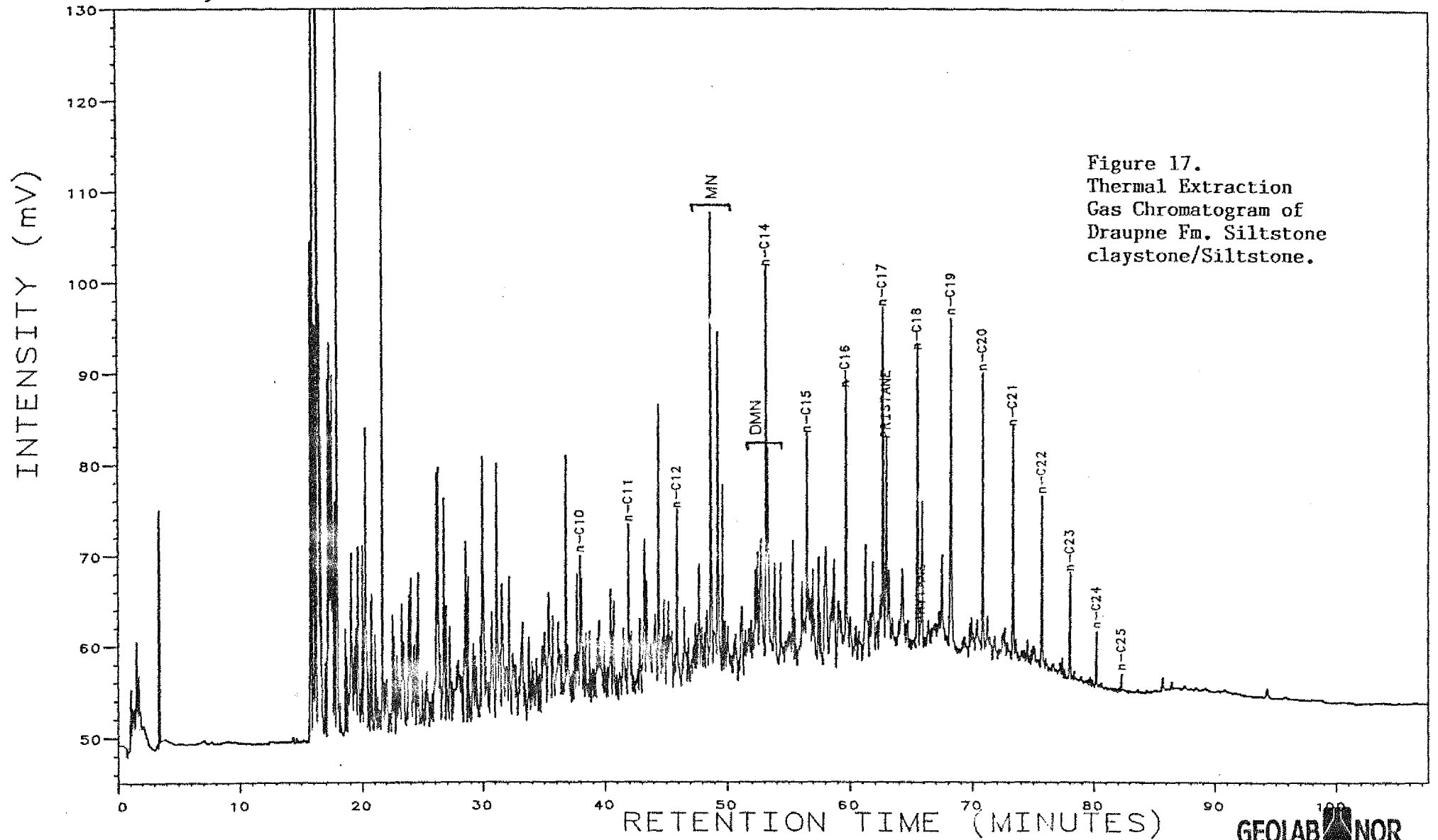


Figure 17.  
Thermal Extraction  
Gas Chromatogram of  
Draupne Fm. Siltstone  
claystone/Siltstone.

Analysis T21532677

26, 1, 1

30/6-5, 2677m, S1

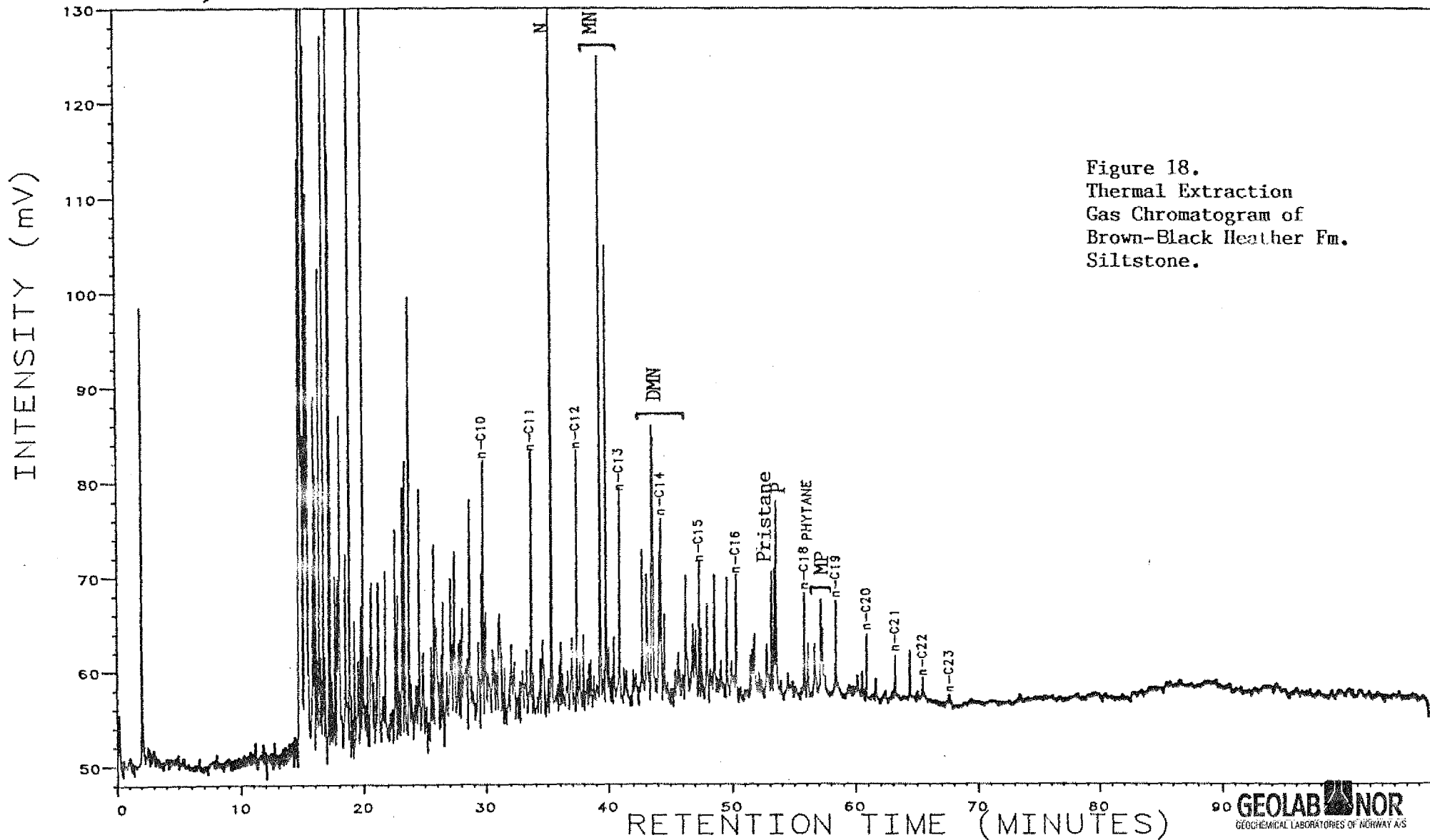


Figure 18.  
Thermal Extraction  
Gas Chromatogram of  
Brown-Black Heather Fm.  
Siltstone.

Analysis T21532965

26, 1, 1

30/6-5, 2965m, S1

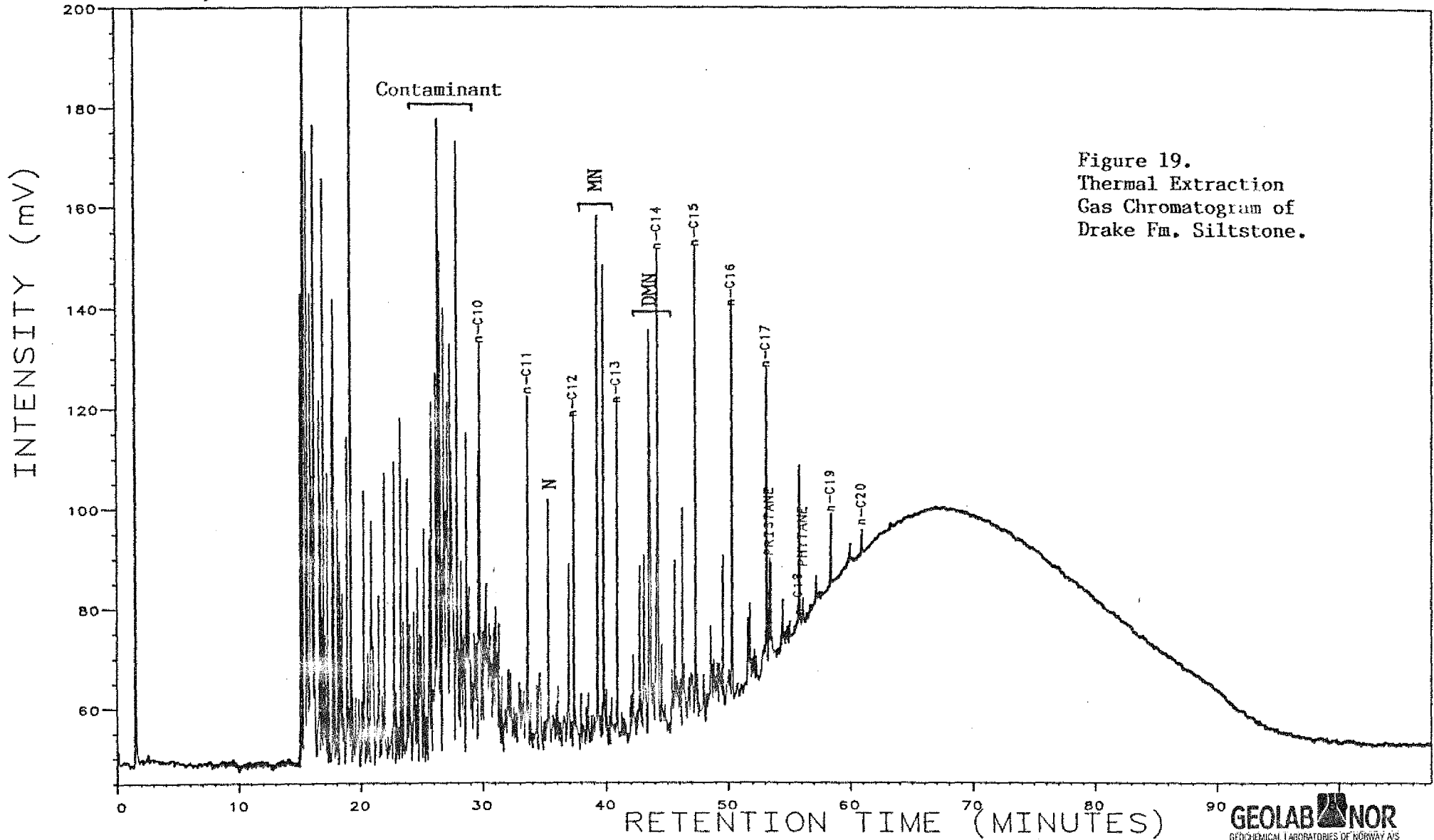


Figure 19.  
Thermal Extraction  
Gas Chromatogram of  
Drake Fm. Siltstone.

Analysis T21533025

26, 1, 1

30/6-5, 3025m, S1

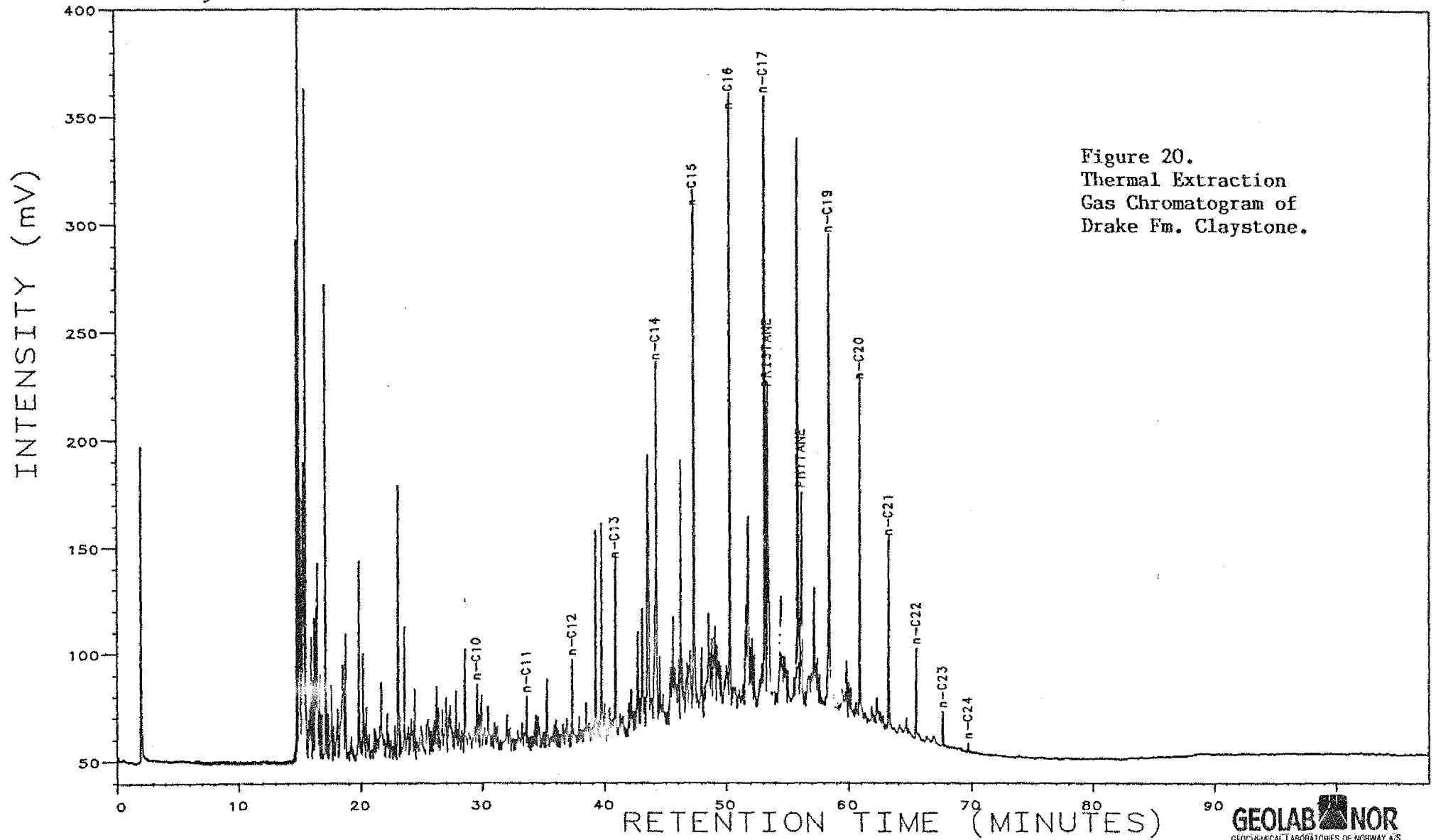


Figure 20.  
Thermal Extraction  
Gas Chromatogram of  
Drake Fm. Claystone.

Analysis T21533241

26, 1, 1

30/6-5, 3241 m, S21

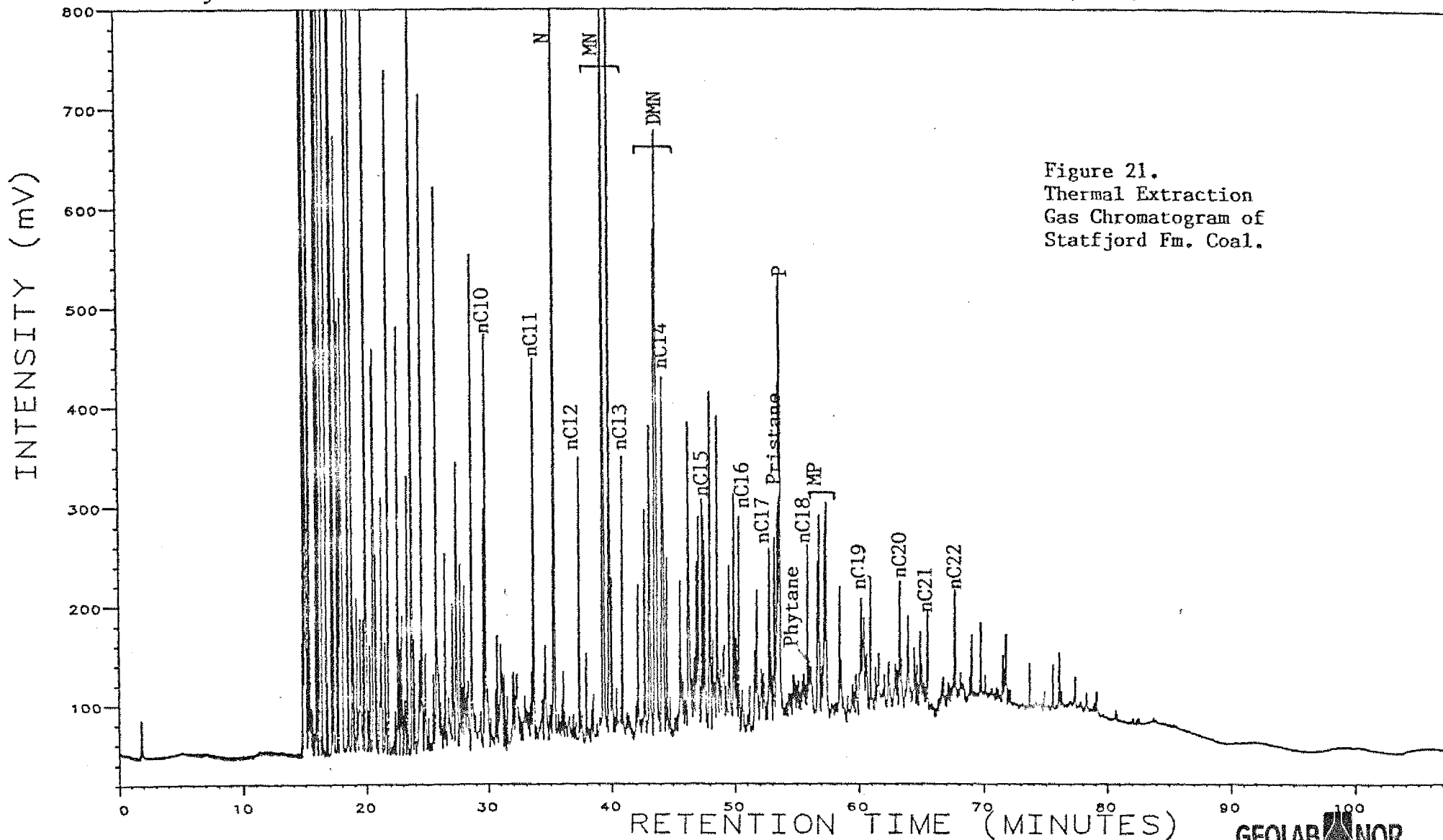
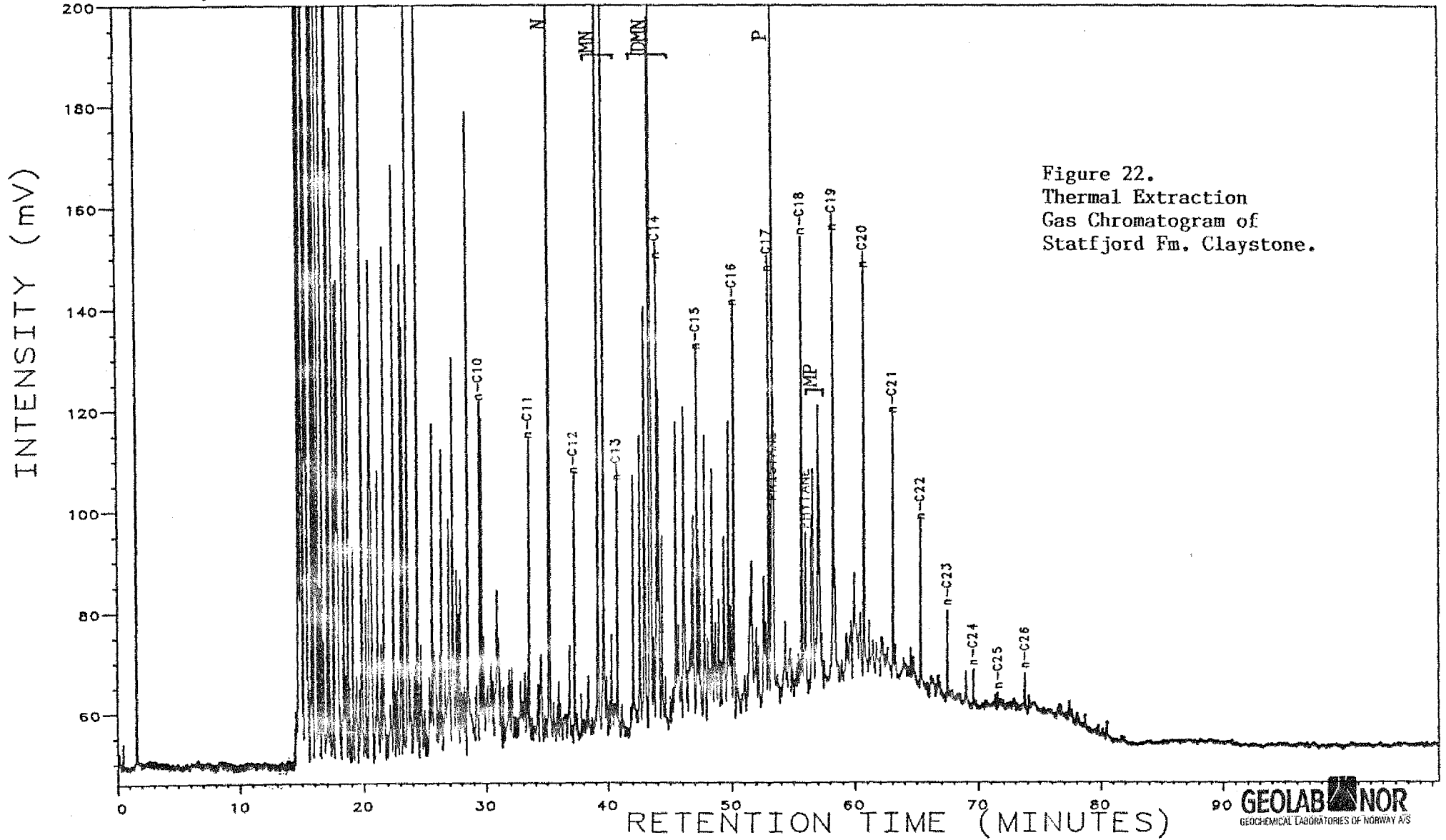


Figure 21.  
Thermal Extraction  
Gas Chromatogram of  
Statfjord Fm. Coal.

Analysis T21533280

26, 1, 1

30/6-5, 3280m, , S/



Analysis T21532485

23, 1, 1

30/6-5, 2485m, S2

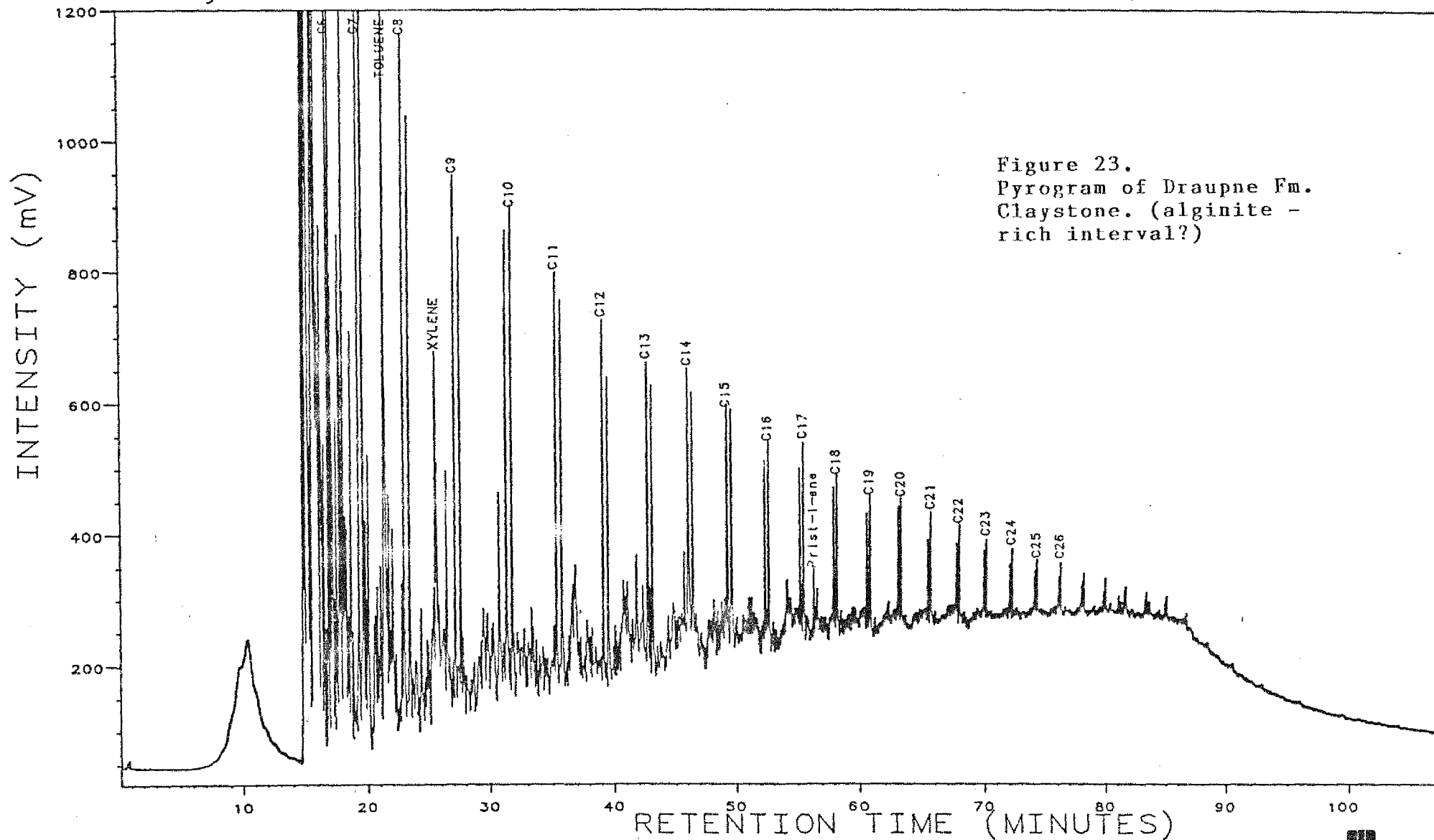


Figure 23.  
Pyrogram of Draupne Fm.  
Claystone. (alginite -  
rich interval?)

Analysis T1532641B

23, 1, 1

30/6-5, 2641m, S2

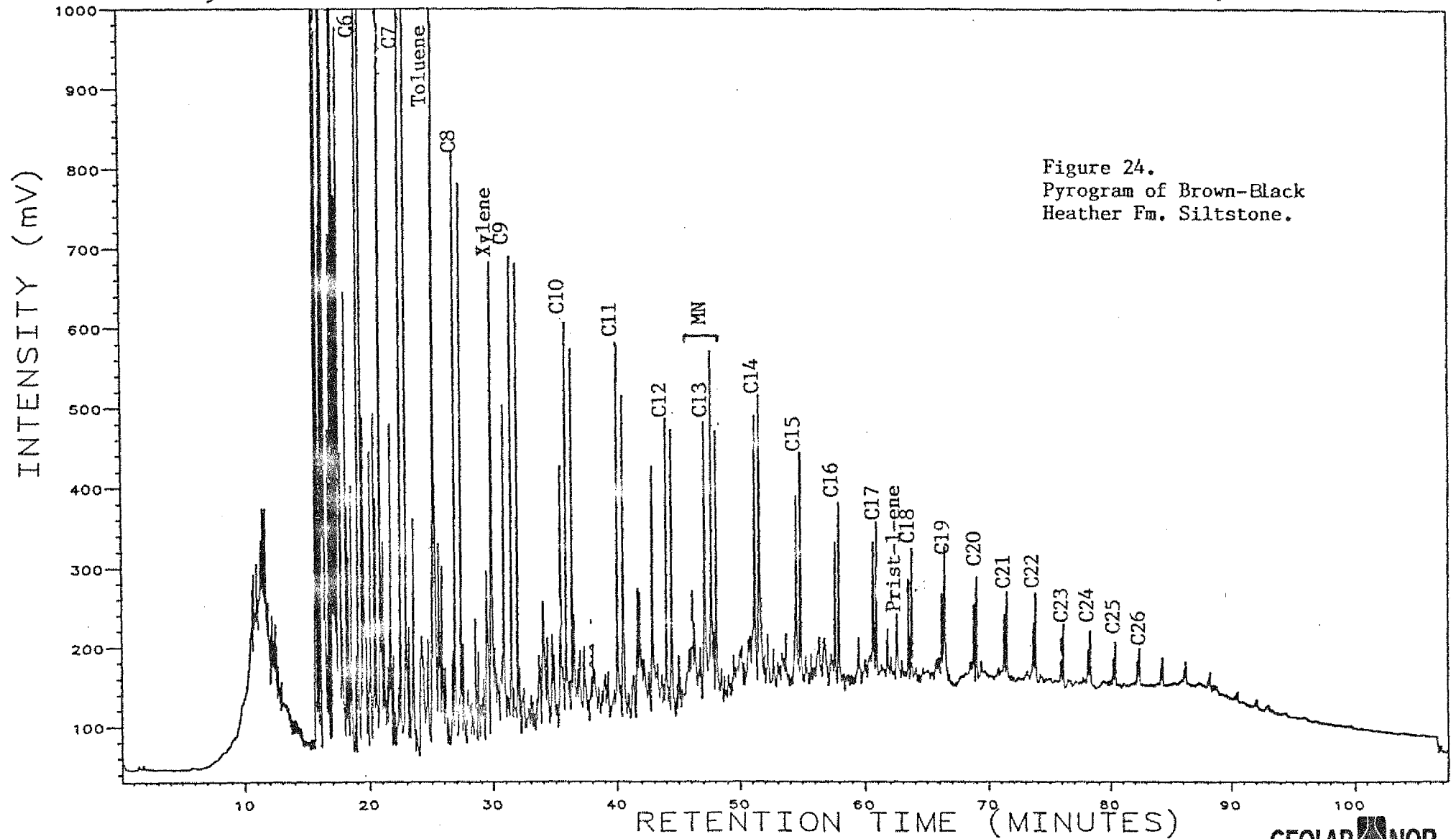


Figure 24.  
Pyrogram of Brown-Black  
Heather Fm. Siltstone.

Analysis T21532785

23, 1, 1

30/6-5, 2785m, S2

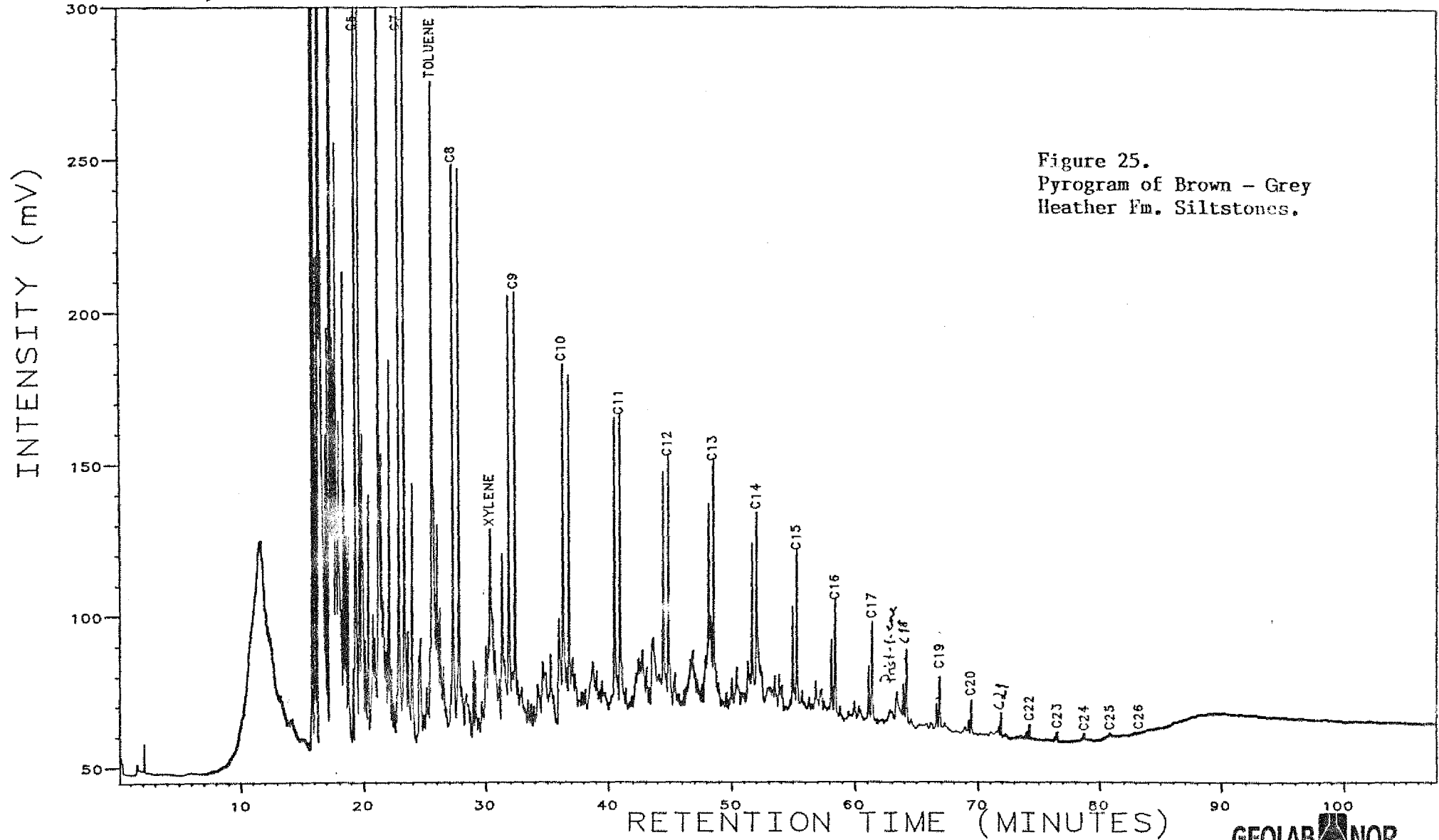


Figure 25.  
Pyrogram of Brown - Grey  
Heather Fm. Siltstones.

Analysis P21532986

29, 1, 1

30/6-5, 2965-2986m, S2

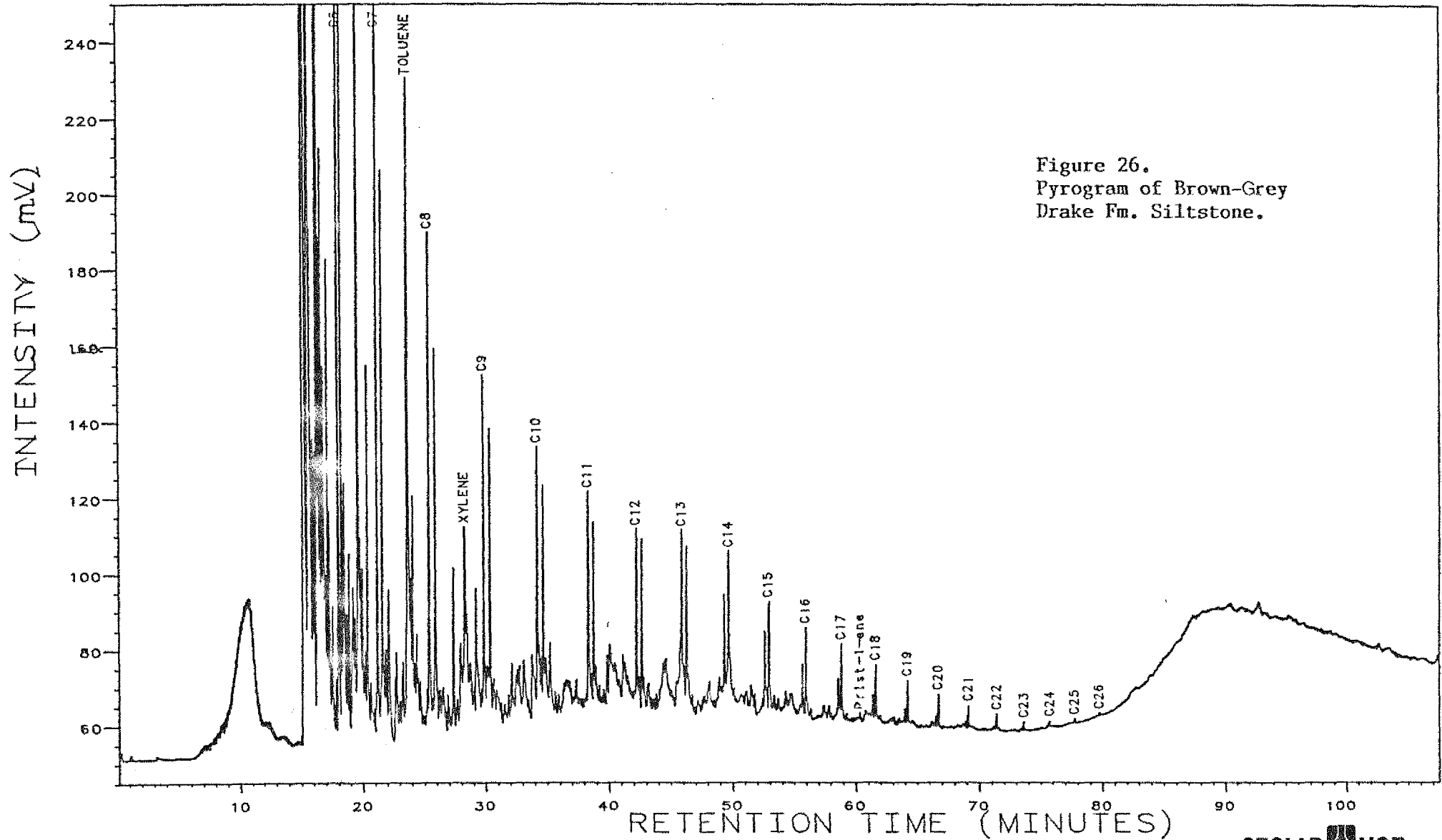


Figure 26.  
Pyrogram of Brown-Grey  
Drake Fm. Siltstone.

Analysis P21533061

29, 1, 1

30/6-5, 3025-3061m, S2

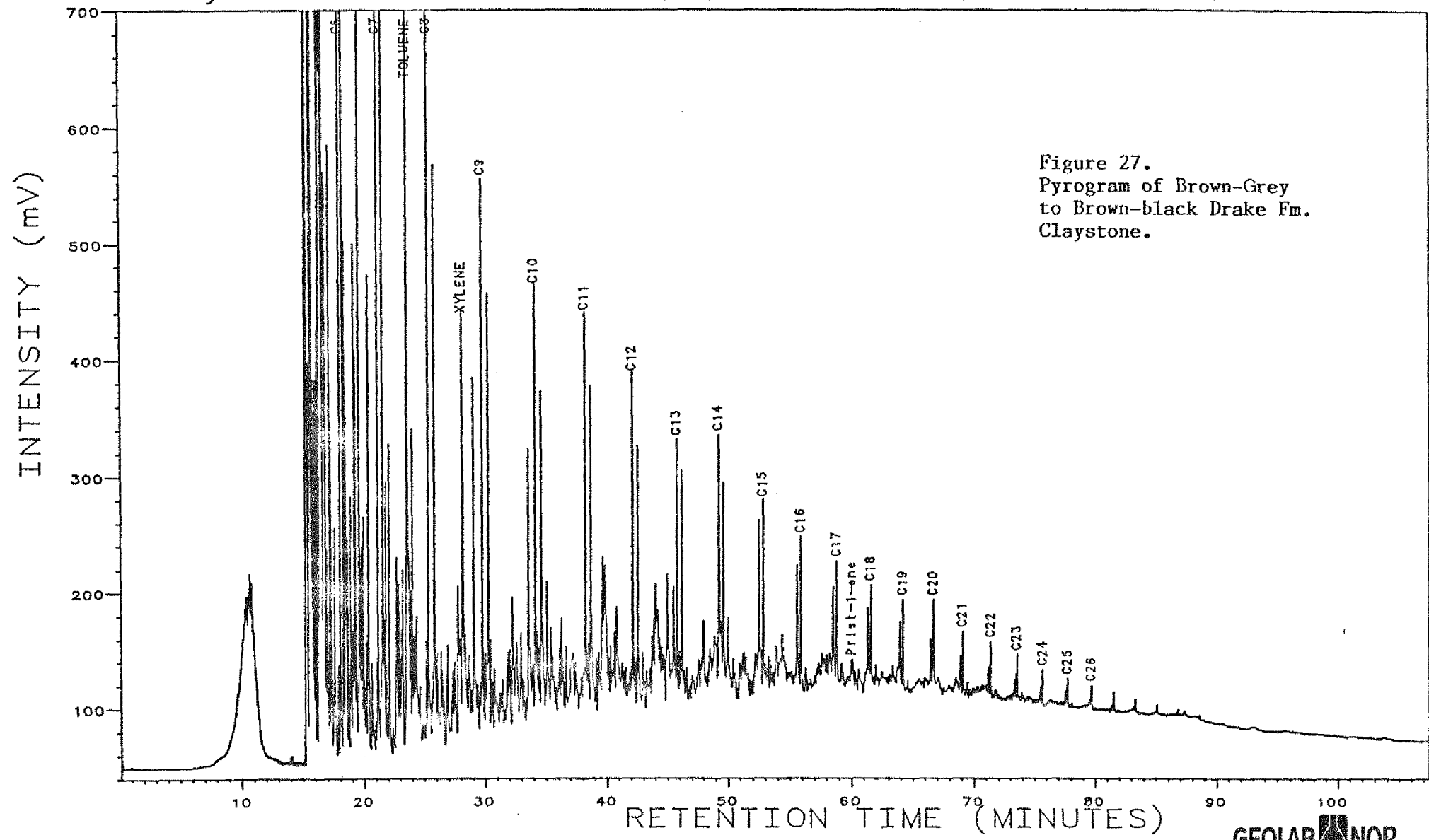


Figure 27.  
Pyrogram of Brown-Grey  
to Brown-black Drake Fm.  
Claystone.

Analysis T21533127

25, 1, 1

30/6-5, 3127m, CLST, S2

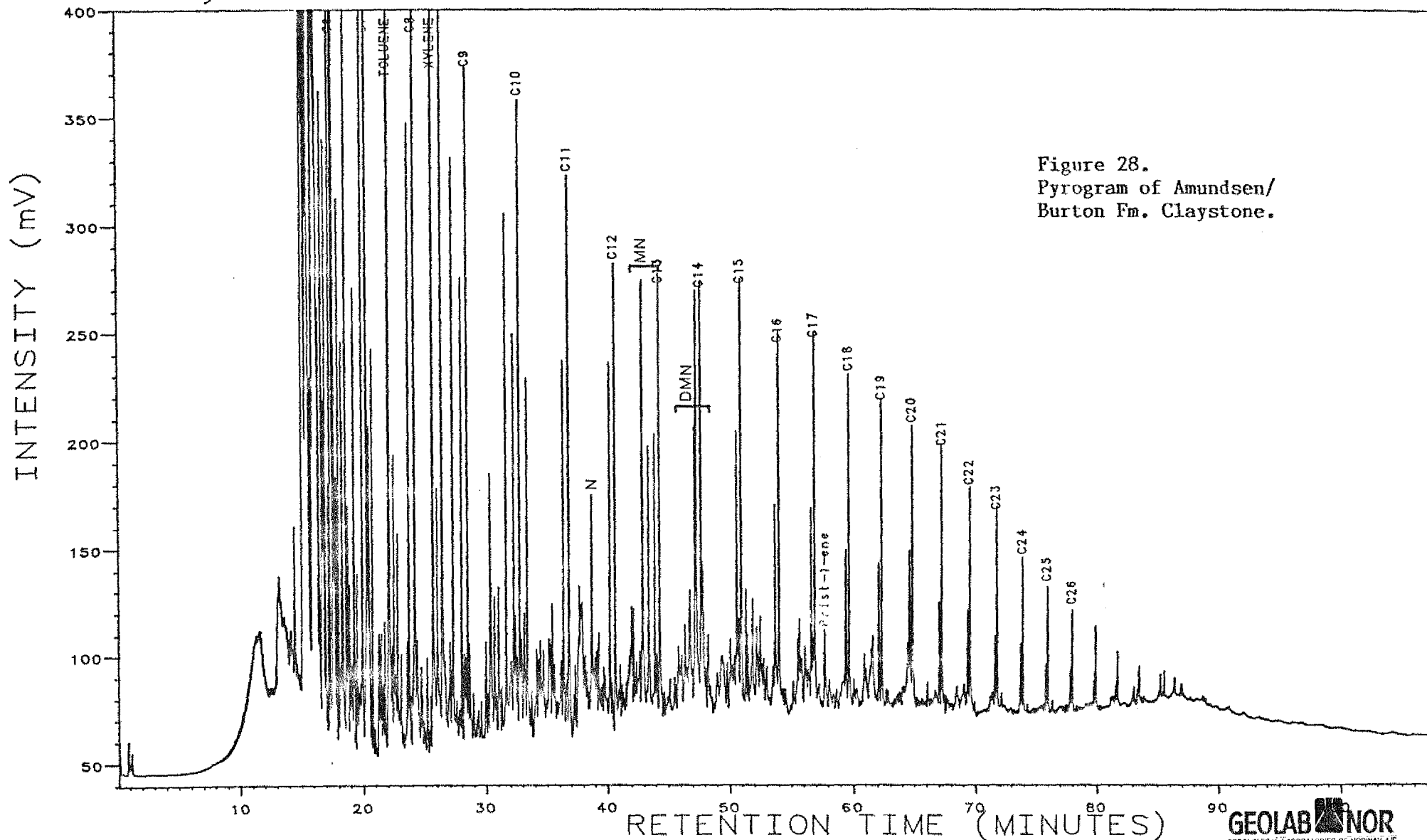


Figure 28.  
Pyrogram of Amundsen/  
Burton Fm. Claystone.

Analysis T21533325

23, 1, 1

30/6-5, 3325m, COAL, S2

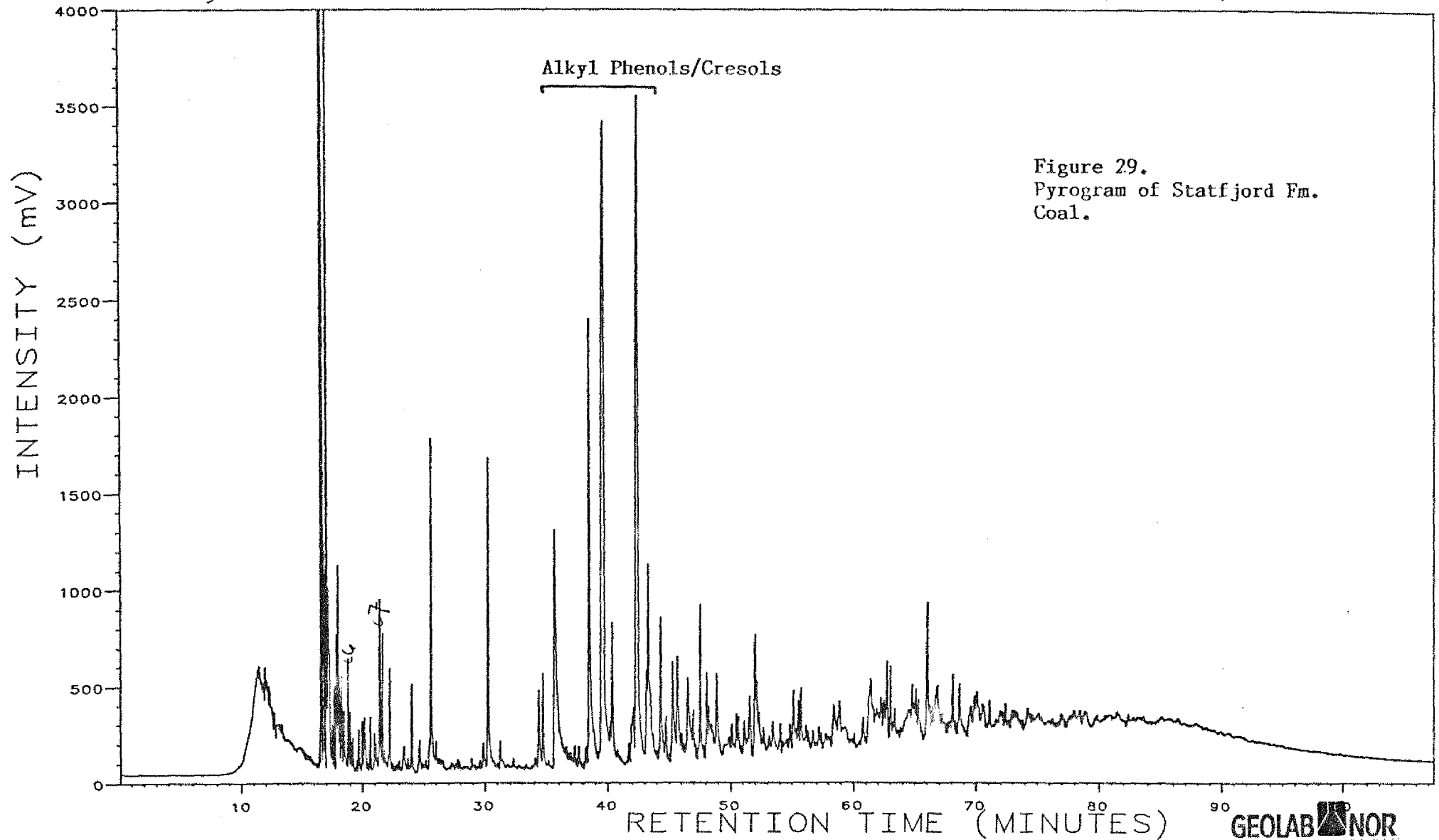


Figure 30.

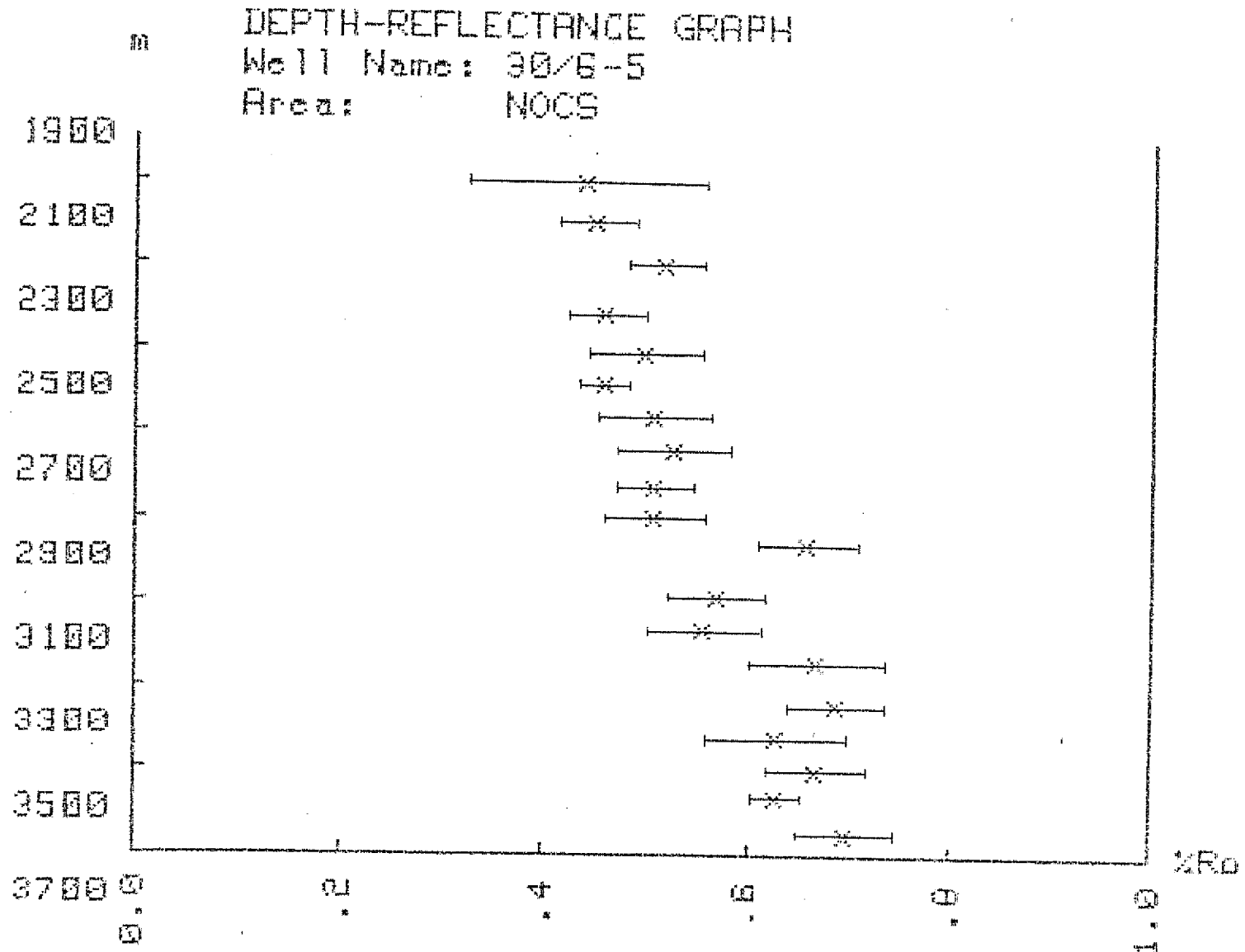


Figure 31. KEROGEN COMPOSITION AND POTENTIAL HYDROCARBON PRODUCTS FOR WELL NOCS 30/6-5.

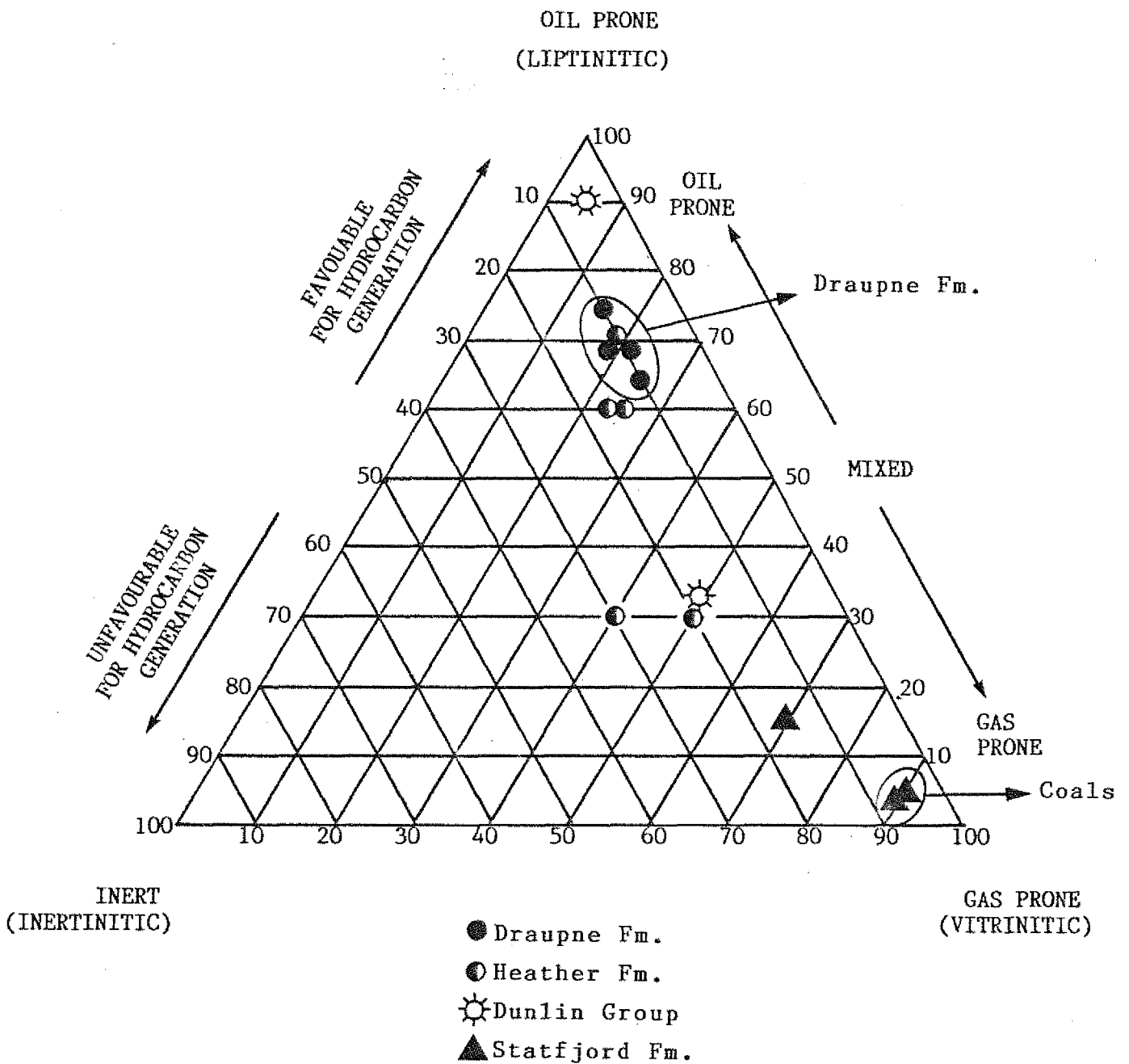


Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
1909.00				Rogl Bald Tert/L.Pale		001
				50 Sh/Clst: gy red		001-1
				25 Sh/Clst: brn gy, pyr		001-2
				15 Ca : drk y brn to dsk y brn, dol		001-3
				10 Ca : w to lt gy		001-4
				tr Other : pyr		001-5
1933.00				Rogl Bald Tert/L.Pale		002
				50 Sh/Clst: gy red		002-1
				25 Tuff : lt gy to m gy, slt		002-5
				10 Sh/Clst: brn gy, pyr		002-2
				10 Ca : w to lt gy		002-4
				5 Ca : drk y brn to dsk y brn, dol		002-3
1957.00				Rogl Bald Tert/L.Pale		003
				80 Tuff : lt gy to m gy, slt		003-1
				15 Sh/Clst: gy red		003-2
				5 Ca : drk y brn to dsk y brn, dol		003-3
1981.00				Rogl Bald Tert/L.Pale		004
				50 Tuff : gn gy to m gy		004-1
				25 Sh/Clst: gn gy to m gy, calc		004-2
				25 Ca : lt gy to lt brn gy, pyr		004-3
				tr Sh/Clst: gy red		004-4
2005.00				Rogl Bald Tert/L.Pale		005
				40 Sh/Clst: ol gy to lt ol gy, m drk gy		005-2
				20 Ca : lt gy, lt ol gy, m drk gy		005-4
				15 Tuff : gn gy to m gy		005-1
				15 Sh/Clst: gn gy, calc, pyr		005-3
				10 Sh/Clst: gy red		005-5

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2029.00				Rpgl Bald Tert/L.Pale		006
			40	Sh/Clst: ol gy, lt gy, m drk gy		006-3
			25	Sh/Clst: lt gy, lt ol gy, m drk gy, slt, lam		006-4
			20	Sh/Clst: gy red		006-1
			15	Ca : lt gy to lt ol gy		006-5
			tr	Sh/Clst: gn gy, calc, pyr		006-2
2053.00				Rogl Sele Tert/Dani-E.Pale		007
			25	Sh/Clst: lt gy, lt ol gy, m drk gy, pyr, slt, lam		007-4
			20	Tuff : brn gy		007-1
			20	Sh/Clst: gy red		007-2
			20	Sh/Clst: gn gy, pyr		007-3
			15	Ca : y gy, lt gy to lt ol gy		007-5
2077.00				Rogl Sele Tert/Dani-E.Pale		008
			30	Sh/Clst: gn gy, pyr		008-2
			30	Sh/Clst: ol gy, lt brn gy, lt ol gy, m drk gy, slt		008-5
			20	Ca : gy pi, y gy		008-6
			10	Sh/Clst: gy red		008-3
			5	Tuff : brn gy, gn gy		008-1
			5	Ca : brn gy, dol		008-4
2101.00				Rogl Sele Tert/Dani-E.Pale		009
			70	Sh/Clst: gn gy, calc, pyr		009-1
			15	Sh/Clst: gy red		009-2
			10	Sh/Clst: ol gy to drk gy, slt		009-3
			5	Ca : gy pi, y gy		009-4

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2125.00				Rogl List Tert/Dani-E.Pale		010
			70	Sh/Clst: gn gy, calc, pyr		010-1
			20	Ca : gy pi to y gy, m gy		010-3
			10	Sh/Clst: gy red to red blk		010-2
			tr	Sh/Clst: brn gy to ol gy		010-4
2173.00				Rogl List Tert/Dani-E.Pale		011
			45	Sh/Clst: gn gy, pyr		011-1
			45	Sh/Clst: ol gy to m gy		011-2
			10	Ca : w to brn blk		011-3
2197.00				Rogl List Tert/Dani-E.Pale		012
			45	Sh/Clst: ol gy to lt ol gy, m drk gy		012-2
			30	Sh/Clst: gn gy, calc		012-1
			20	Ca : y gy to brn blk		012-3
			5	Sh/Clst: gy red		012-4
2245.00				Shtl U.Cr/L.Maas		013
			60	Ca : w to y gy		013-1
			20	Sh/Clst: gn gy, calc, pyr		013-2
			10	Sh/Clst: ol gy to m gy		013-3
			10	Sh/Clst: gy red to brn gy		013-4
			tr	Other : pyr		013-5
2317.00				Shtl U.Cr/L.Camp		014
			40	Ca : w to y gy		014-1
			30	Sh/Clst: brn gy, ol gy, lt brn gy, calc		014-3
			25	Sh/Clst: gn gy, calc, pyr		014-2
			5	Sh/Clst: gy red		014-4

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2344.00			Shtl	U.Cr/L.Camp		015
			70	Sh/Clst: brn blk, carb, mic		015-3
			10	Ca : w to y gy		015-1
			10	Sh/Clst: gn gy, calc, pyr		015-2
			10	Sltst : brn gy, carb, mic		015-4
2365.00			Shtl	U.Cr/L.Camp		016
			85	Sh/Clst: brn gy, ol gy to lt ol gy, m gy to m drk gy, slt, mic, glauc		016-5
			10	Ca : w to y gy		016-6
			5	Sh/Clst: gn gy, calc		016-7
2389.00			Shtl	U.Cr/L.Camp		017
			45	Sh/Clst: gn gy		017-1
			30	Ca : gy pi to brn gy, drk gn gy, dol		017-3
			20	Sh/Clst: ol gy to m drk gy, calc		017-2
			5	Sh/Clst: dsk red, calc		017-4
			tr	Other : pyr, mic		017-5
2413.00			Crkn	L.Cr/Apti-Albi		018
			50	Sh/Clst: m gy to m drk gy, calc		018-2
			15	Sh/Clst: gn gy, calc		018-1
			15	Cont : dd		018-4
			10	Sh/Clst: ol gy, calc		018-3
			5	Ca : w to y gy		018-5
			5	Sh/Clst: gy red, calc		018-6
2428.00			Crkn	L.Cr/Apti-Albi		019
			80	Sh/Clst: brn gy, ol gy, m gy, calc, mic		019-1
			10	Ca : w to brn gy, pyr		019-4
			5	Sh/Clst: gn gy, calc		019-2
			5	Sh/Clst: gy red to red blk, calc		019-3

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2437.00				Crkn L.Cr/Apti-Albi		020
		0.45		80 Sh/Clst: brn gy, ol gy, m gy, calc, mic		020-1
				10 Sh/Clst: gn gy, calc		020-2
				5 Sh/Clst: gy red to red blk, calc		020-3
				5 Ca : w to brn gy, pyr		020-4
2446.00				Crkn L.Cr/Apti-Albi		021
				40 Sh/Clst: ol gy to lt ol gy, m gy to m drk gy, calc		021-3
				30 Sh/Clst: gy red, calc, mic		021-1
				20 Sh/Clst: gn gy, mic		021-2
				10 Ca : brn gy to y gy, pyr		021-4
2452.00				Crkn L.Cr/Barr		022
		0.49		55 Sh/Clst: ol gy to lt ol gy, m lt gy to m drk gy, calc, mic		022-2
				30 Ca : w to y gy, pyr		022-1
				10 Sh/Clst: gn gy, calc		022-3
				5 Sh/Clst: gy red, calc		022-4
2458.00				Viki Drau L.Cr/L.Rhya		023
				30 Ca : w to y gy, pyr		023-1
		5.98		30 Sh/Clst: brn blk, carb, mic, wx		023-4
cvd				25 Sh/Clst: ol gy, m gy to m drk gy, calc, mic		023-3
cvd				10 Sh/Clst: gn gy, calc		023-2
cvd				5 Sh/Clst: gy red, calc		023-5
2461.00				Viki Drau L.Cr/L.Rhya		024
				30 Sh/Clst: gn gy		024-2
		5.46		30 Sh/Clst: brn blk, carb, mic, wx		024-4
cvd				20 Ca : w to y gy, pyr		024-1
cvd				20 Sh/Clst: brn gy, ol gy, m gy to m drk gy, calc, slt, mic		024-3
cvd				tr Sh/Clst: gy red, calc		024-5

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2470.00				Viki Drau U.Ju/(L.Cr)L.Volg-E.Rhya		025
	cvd	5.98	65	Sh/Clst: brn blk, carb, mic, wx		025-4
	cvd		15	Sh/Clst: brn gy, ol gy, m gy to m drk gy, calc, slt, mic		025-3
	cvd		10	Ca : w to y gy, pyr		025-1
	cvd		10	Sh/Clst: gn gy		025-2
2473.00				Viki Drau U.Ju/(L.Cr)L.Volg-E.Rhya		026
		0.20	50	Sh/Clst: ol gy, m gy to m drk gy, calc, mic		026-3
			30	Sh/Clst: gn gy, pyr, glauc		026-2
			20	Ca : w to y gy, pyr, glauc		026-1
2485.00				Viki Drau U.Ju/(L.Cr)L.Volg-E.Rhya		027
	cvd	5.09	70	Sh/Clst: brn blk, carb, slt, mic		027-4
	cvd		20	Sh/Clst: ol gy, m gy to m drk gy, calc, mic		027-3
	cvd		5	Ca : w to y gy, pyr		027-1
	cvd		5	Sh/Clst: gn gy, pyr, glauc		027-2
2497.00				Viki Drau U.Ju/(L.Cr)L.Volg-E.Rhya		028
	cvd	4.99	70	Sh/Clst: brn blk, carb, slt, mic		028-4
	cvd		20	Sh/Clst: ol gy, m gy to m drk gy, calc, mic		028-3
	cvd		5	Ca : w to y gy, pyr		028-1
	cvd		5	Sh/Clst: gn gy, pyr, glauc		028-2
2512.00				Viki Drau U.Ju/M.Volg		029
	cvd	7.67	75	Sh/Clst: brn blk, carb, slt, mic		029-4
	cvd		10	Sh/Clst: gn gy, pyr		029-2
	cvd		10	Sh/Clst: ol gy, m gy to m drk gy, calc, mic		029-3
	cvd		5	Ca : w to y gy, pyr		029-1

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2521.00				Viki Drau U.Ju/E.Volg		030
	cvd	5.87	80	Sh/Clst: brn blk to ol blk, carb, slt, mic		030-4
	cvd		10	Sh/Clst: ol gy, m gy to m drk gy, calc, slt, mic		030-3
	cvd		5	Ca : w to y gy, pyr		030-1
	cvd		5	Sh/Clst: gn gy, calc, pyr		030-2
2533.00				Viki Drau U.Ju/E.Volg		031
	cvd	6.10	90	Sh/Clst: brn blk to ol blk, carb, slt, mic		031-1
	cvd		5	Sh/Clst: brn gy, calc, mic		031-2
	cvd		5	Sh/Clst: gn gy, calc, pyr		031-3
	cvd		tr	Ca : w to y gy, pyr		031-4
2545.00				Viki Drau U.Ju/E.Volg		032
	cvd	5.87	90	sltst : brn blk, carb, mic		032-1
	cvd		10	Sh/Clst: ol gy to m gy, calc, slt, mic		032-2
	cvd		tr	Sh/Clst: gn gy, calc		032-3
	cvd		tr	Cont : cem		032-4
2557.00				Viki Drau U.Ju/E.Volg		033
	cvd	5.07	90	sltst : brn blk, carb, mic		033-1
	cvd		10	Sh/Clst: ol gy to m gy, calc, slt, mic		033-2
	cvd		tr	Sh/Clst: gn gy, calc		033-3
	cvd		tr	Cont : cem		033-4
2563.00				Viki Drau U.Ju/E.Volg		034
		4.65	70	sltst : brn blk to ol blk, carb, mic		034-1
			25	Sh/Clst: ol gy to m gy, calc, slt		034-2
			5	Ca : w to y gy, pyr		034-3

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2581.00				Viki Drau U.Ju/Kimm		035
		5.79		90 Sltst : brn blk to ol blk, carb, mic		035-1
				10 Sh/Clst: ol gy to m gy, calc, slt		035-2
	cvd			tr Sh/Clst: gn gy, calc		035-3
	cvd			tr Ca : w to y gy, pyr		035-4
2599.00				Viki Heat U.Ju/Kimm		036
		3.50		90 Sltst : brn blk to ol blk, carb, mic		036-1
				10 Sh/Clst: ol gy to m gy, calc, slt		036-2
	cvd			tr Sh/Clst: gn gy, calc		036-3
	cvd			tr Ca : w to y gy, pyr		036-4
2605.00				Viki Heat U.Ju/Kimm		037
		4.93		50 Sh/Clst: brn blk, carb, slt, mic		037-2
				30 Cont : Coal-ad		037-1
				20 Sh/Clst: ol gy to m gy, calc, slt, mic		037-3
	cvd			tr Sh/Clst: gn gy, calc		037-4
2617.00				Viki Heat U.Ju/Kimm		038
		4.63		40 Sh/Clst: ol gy to m gy, calc, mic		038-1
				30 Sltst : brn blk, carb, pyr, mic		038-2
				15 Ca : y gy to lt gy, pyr		038-4
				10 Sh/Clst: gn gy, calc		038-3
	cvd			5 Sh/Clst: gy red, calc		038-5
2624.00				Viki Heat U.Ju/Kimm		039
				40 Sh/Clst: ol gy to m gy, calc, mic		039-1
				30 Sltst : brn blk, carb, pyr, mic		039-2
				15 Ca : y gy to lt gy, pyr		039-4
				10 Sh/Clst: gn gy, calc		039-3
	cvd			5 Sh/Clst: gy red, calc		039-5

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
2641.00			Viki Heat U.Ju/Kimm			040
	3.74	60	Sltst	:	brn blk, carb, mic	040-2
		15	Cont	:	dd	040-1
		10	Sh/Clst:		gn gy, calc, pyr	040-3
		10	Ca	:	y gy to brn gy	040-5
		5	Sh/Clst:		brn gy, ol gy to m gy, mic	040-4
2653.00			Viki Heat U.Ju/Oxfo			041
	0.63	50	Sh/Clst:		ol gy, lt gy to lt ol gy, m gy, mic	041-3
		35	Sltst	:	brn blk, carb, mic	041-1
		10	Sh/Clst:		gn gy, calc, pyr	041-2
		5	Ca	:	y gy to brn gy	041-4
2665.00			Viki Heat U.Ju/Oxfo			042
	5.04	65	Sltst	:	brn blk, carb, mic	042-1
		20	Sh/Clst:		gn gy, pyr	042-2
		15	Sh/Clst:		ol gy, lt gy, lt ol gy, m gy, calc, mic	042-3
		tr	Ca	:	y gy to brn gy	042-4
		tr	Sh/Clst:		red gy	042-5
2677.00			Viki Heat U.Ju/Oxfo			043
	5.13	70	Sltst	:	brn blk, carb, mic	043-1
		20	Sh/Clst:		brn gy to lt brn gy, calc, pyr, slt	043-2
		5	Sh/Clst:		gn gy, pyr	043-3
		5	Sh/Clst:		ol gy to m gy, calc, mic	043-4
		tr	Ca	:	w to y gy	043-5
2689.00			Viki Heat U.Ju/Oxfo			044
		50	Sltst	:	brn blk, carb, slt, mic	044-1
	0.57	30	Sh/Clst:		ol gy, lt gy, lt ol gy, m gy, calc, mic	044-2
		15	Sh/Clst:		gn gy	044-3
		5	Sh/Clst:		gy red	044-4
		tr	Ca	:	w to y gy	044-5

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2701.00				Viki Heat U.Ju/Oxfo		045
	4.81		30	Sltst : brn blk, carb, slt, mic		045-1
			30	Cont : dd		045-5
			20	Sh/Clst: ol gy to m gy, calc, mic		045-2
			10	Sh/Clst: gn gy		045-3
			10	S/Sst : w to brn gy, calc, glauc		045-4
2713.00				Viki Heat U.Ju/Oxfo		090
	0.95		60	Sltst : brn gy to y gy, calc, carb, s, mic, glauc, kln		090-1
			20	Sh/Clst: ol gy to m gy, calc, slt, mic, glauc		090-2
			10	Sh/Clst: brn blk to ol blk, carb, mic, wx		090-3
			10	Cont : dd		090-4
			tr	Sh/Clst: gy red		090-5
2722.00				Viki Heat U.Ju/Oxfo		091
	1.29		30	Sltst : brn gy to y gy, calc, carb, s, mic, glauc, kln		091-1
	1.29		30	Sh/Clst: ol blk, m lt gy to m drk gy, calc, mic		091-3
			20	Cont : dd		091-4
			15	Sh/Clst: gy blk to ol blk, carb, slt, mic		091-2
			5	Ca : Y gy		091-5
			tr	Sh/Clst: gy red		091-6
2734.00				Viki Heat M.Ju/L.Call		092
	1.51		50	Sltst : brn gy to y gy, calc, carb, s, mic, glauc, kln		092-1
			30	Sh/Clst: gn gy, ol gy to m gy, calc		092-3
			20	Sh/Clst: brn blk to ol blk, carb, slt, mic, wx		092-2
			tr	Sh/Clst: gy red		092-4
			tr	Ca : Y gy		092-5
			tr	Sh/Clst: gy red		092-6

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2746.00				Viki Heat M.Ju/L.Call		093
	1.51	50	Sltst	: brn gy, carb, s, mic, glauc		093-1
		25	Sh/Clst:	lt ol gy to m drk gy, calc, pyr, slt, mic, glauc		093-3
		15	Sh/Clst:	drk gy, carb, slt, mic		093-2
		10	Ca	: w to m lt gy, pyr		093-4
		tr	Sh/Clst:	m brn to drk y brn, calc		093-5
		tr	Sh/Clst:	gy red		093-6
2764.00				Viki Heat M.Ju/M.Call		094
		30	Sh/Clst:	ol gy to lt ol gy, m gy to m drk gy, calc, slt, mic		094-2
		25	Sh/Clst:	gn gy, pyr, mic		094-3
	4.15	20	Sh/Clst:	blk, brn blk, ol blk, calc, carb, slt, mic		094-1
		15	S/Sst	: brn gy, carb, mic, cem		094-4
		10	Sh/Clst:	m brn to drk y brn, calc		094-5
		tr	Ca	: w to y gy		094-6
2773.00				Viki Heat M.Ju/M.Call		095
	0.81	40	Sltst	: brn gy to lt brn gy, calc, carb, s, mic, glauc		095-1
	0.75	40	Sh/Clst:	lt ol gy to m drk gy, calc, pyr, slt, mic, glauc		095-4
		15	Sh/Clst:	gy brn to m brn		095-3
		5	Sh/Clst:	gn gy, pyr		095-5
		tr	Sh/Clst:	blk to gy blk, carb		095-2
		tr	Ca	: w to m lt gy, pyr		095-6
2785.00				Viki Heat M.Ju/M.Call		096
	1.19	40	Sltst	: brn gy to lt brn gy, calc, s, mic		096-1
		30	Cont	: bar		096-5
		15	Sh/Clst:	brn gy, ol gy to lt ol gy, m gy, calc, mic		096-3
		10	Sh/Clst:	gy blk to drk gy, carb, mic		096-2
		5	Sh/Clst:	gn gy, pyr		096-4
		tr	Sh/Clst:	gy brn to m brn		096-6
		tr	Ca	: w to m lt gy, pyr		096-7

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2797.00				Viki Heat M.Ju/M.Call		097
	0.10	60	Sh/Clst:	brn gy to lt brn gy, mic		097-1
		30	Sltst	: brn gy to lt brn gy, calc, s, mic		097-2
		10	Sh/Clst:	ol gy to lt ol gy, m gy, calc, mic		097-3
		tr	Sh/Clst:	gy brn to m brn		097-4
		tr	Sh/Clst:	gy blk, carb, mic		097-5
		tr	Ca	: w to m lt gy, pyr		097-6
		tr	Ca	: w to m lt gy, pyr		097-7
2803.00				Viki Heat M.Ju/E.Call		098
	0.47	95	Sh/Clst:	pu, brn gy, gn gy, ol gy, m gy, m brn, calc		098-1
		5	Sltst	: brn gy, calc, s, mic		098-2
		tr	Ca	: w to m lt gy, pyr		098-3
2821.00				Viki Heat M.Ju/E.Call		099
		80	Cont	: Coal-ad, prp, dd, bar, fib		099-1
		15	Sltst	: brn gy to brn blk, calc, mic		099-2
		5	Sh/Clst:	gn gy, ol gy to m gy, mic		099-3
2836.00				Viki Heat M.Ju/E.Call		100
		90	Cont	: Coal-ad, cem, prp, dd, bar, fib		100-1
		10	Sh/Clst:	lt brn gy to drk gy, calc, slt, mic		100-2
2845.00				Bren Ness M.Ju/E.Bath-L.Bajo		101
		70	Cont	: Coal-ad, cem, prp, dd, bar, fib		101-1
		20	S/Sst	: w, l		101-2
	cvd	10	Sh/Clst:	brn gy, lt ol gy, m gy to m lt gy, calc, slt, mic		101-3

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2857.00				Bren Ness M.Ju/E-M.Bajo		102
	cvd		65	Sh/Clst: gy blk, brn gy to brn blk, ol gy, carb, mic, wx		102-2
		40.41	30	Coal : blk		102-1
			5	Cont : prp		102-3
			tr	S/Sst : w to y gy, glauc, cem		102-4
2866.00				Bren Ness M.Ju/E-M.Bajo		103
	cvd		50	S/Sst : w, mic, l		103-1
			35	Sh/Clst: gy blk, brn gy to brn blk, carb, wx		103-3
		51.00	10	Coal : blk		103-2
			5	Cont : prp		103-5
			tr	Sltst : brn gy to brn blk, mic		103-4
2953.00				Dunl Drak M.Ju/M-L.Toar		104
		0.18	95	S/Sst : y gy, mic, l, kln		104-1
			5	Cont : prp		104-4
			tr	Coal : blk		104-2
			tr	Sh/Clst: gy blk, brn gy, carb, wx		104-3
2965.00				Dunl Drak M.Ju/M-L.Toar		105
	cvd		50	S/Sst : brn gy to y gy, calc, carb, mic, cem, l, kln		105-1
		1.84	30	Sltst : brn gy, carb, cly, mic		105-2
	cvd		15	Coal : blk		105-3
			5	Cont : cem, prp		105-4
2977.00				Dunl Drak M.Ju/M-L.Toar		106
	cvd		45	S/Sst : brn gy to y gy, calc, carb, mic, cem, l, kln		106-1
		1.52	45	Sltst : brn gy, carb, cly, mic		106-2
	cvd		10	Coal : blk		106-3
			tr	Cont : cem, prp		106-4

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
2986.00				Dunl Drak M.Ju/M-L.Toar		107
	1.34	60	Sltst	: brn gy to brn blk, carb, cly, mic		107-1
		30	S/Sst	: y gy, mic, glauc, cem, l, kln		107-2
	cvd	5	Coal	: blk		107-3
		5	Cont	: prp, dd		107-4
3001.00				Dunl Drak L.Ju/M-L.Toar		047
		65	S/Sst	: w to y gy, mic, l, kln		047-1
		25	Sltst	: brn gy to y gy, carb, mic		047-2
	cvd	10	Sh/Clst	: brn blk to ol gy, slt, mic		047-3
		tr	Coal	: blk		047-4
3013.00				Dunl Drak L.Ju/M-L.Toar		048
	0.11	70	S/Sst	: y gy to lt brn gy, mic, cem, l, lam, kln		048-1
		30	Sltst	: brn gy to y gy, carb, mic		048-2
	cvd	tr	Coal	: blk		048-3
		tr	Cont	: prp		048-4
3025.00				Dunl Drak L.Ju/E.Toar		049
	1.85	85	Sh/Clst	: brn gy to brn blk, ol gy, slt, mic		049-2
		15	S/Sst	: y gy to lt brn gy, mic, cem, l, lam, kln		049-1
		tr	Cont	: prp		049-3
3037.00				Dunl Drak L.Ju/E.Toar		050
	1.90	65	Sh/Clst	: brn gy to brn blk, ol gy, slt, mic		050-2
		30	S/Sst	: y gy to lt brn gy, mic, cem, l, lam, kln		050-1
		5	Cont	: prp, dd, fib		050-3

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3049.00				Dunl Drak L.Ju/L.Plie		051
	cvd		30	S/Sst : y gy to lt brn gy, mic, cem, l, lam, kln		051-1
		1.14	30	Sltst : brn gy to y gy, mic		051-2
			30	Sh/Clst: brn gy to brn blk, ol gy, slt, mic		051-3
			10	Cont : prp, dd, fib		051-4
3061.00				Dunl Drak L.Ju/L.Plie		052
		1.86	50	Sh/Clst: brn gy to brn blk, ol gy, slt, mic		052-3
	cvd		30	Sltst : brn gy to y gy, mic, crs, lam		052-2
			20	S/Sst : w to y gy, mic, l, kln		052-1
			tr	Cont : prp, dd, fib		052-4
3073.00				Dunl Cook L.Ju/L.Plie		053
	cvd		75	S/Sst : w to y gy, mic, l, kln		053-1
			25	Sh/Clst: brn gy to brn blk, ol gy, carb, slt, mic		053-3
			tr	Sltst : brn gy to y gy, mic, crs, lam		053-2
			tr	Coal : blk		053-4
			tr	Cont : prp, dd		053-5
3085.00				Dunl Cook L.Ju/L.Plie		054
	cvd		70	S/Sst : w, brn gy, y gy, carb, slt, mic, cem, l, lam, kln		054-1
			30	Sh/Clst: brn gy to brn blk, ol gy, carb, slt, mic		054-2
			tr	Cont : prp, dd		054-3
3097.00				Dunl Cook L.Ju/Hett-E.Plie		055
	cvd	0.32	70	S/Sst : w, brn gy, y gy, carb, slt, mic, cem, l, lam, kln		055-1
			30	Sh/Clst: brn gy to brn blk, ol gy, carb, slt, mic		055-2
			tr	Cont : prp, dd		055-3

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3109.00				Dunl Cook L.Ju/Hett-E.Plie		056
				70 S/Sst : w to y gy, carb, mic, f, cem, lam, kln		056-1
	cvd			15 Sltst : brn gy to brn blk, carb, mic		056-2
				15 Sh/Clst: brn gy to brn blk, carb, mic		056-3
				tr Cont : prp, dd		056-4
3127.00				Dunl Am/b L.Ju/Hett-E.Plie		057
	cvd			70 S/Sst : w to y gy, carb, mic, f, cem, lam, kln		057-1
		1.67		15 Sltst : brn gy to brn blk, carb, mic		057-2
		2.36		15 Sh/Clst: brn gy to brn blk, carb, mic		057-3
				tr Cont : prp, dd		057-4
3139.00				Dunl Am/b L.Ju/Hett-E.Plie		058
		0.30		60 S/Sst : brn gy to y gy, carb, mic, f, cem, lam, kln		058-1
				25 Sh/Clst: brn gy to brn blk, ol gy, carb, mic		058-4
				10 Sltst : brn gy to brn blk, carb, cly, mic		058-2
				5 Coal : blk to brn blk, wx		058-3
				tr Cont : prp, dd		058-5
3145.00				Dunl Am/b L.Ju/Hett-E.Plie		059
		1.11		50 Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx		059-3
				30 S/Sst : brn gy to y gy, carb, mic, f, cem, lam, kln		059-1
				20 Sltst : brn gy to brn blk, carb, cly, mic		059-2
				tr Coal : blk		059-4
				tr Cont : prp, dd		059-5

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3157.00				Dunl Am/b L.Ju/Hett-E.Plie		060
			35	S/Sst : brn gy to y gy, carb, mic, f, cem, lam, kln		060-1
	0.84		35	Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx		060-3
	1.03		30	Sltst : brn gy to brn blk, carb, cly, mic		060-2
3184.00				Dunl Am/b L.Ju/Hett-E.Plie		061
			45	S/Sst : brn gy to y gy, carb, mic, f, cem, lam, kln		061-1
	1.12		45	Sltst : brn gy to brn blk, carb, cly, mic		061-2
			10	Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx		061-3
3193.00				Dunl Am/b L.Ju/Hett-E.Plie		062
			70	S/Sst : brn gy to y gy, carb, mic, cem, l, lam, kln		062-1
			15	Sltst : brn gy to brn blk, carb, cly, mic		062-2
			15	Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx		062-3
			tr	Coal : blk		062-4
3205.00				Dunl Am/b L.Ju/Hett-E.Plie		063
			70	S/Sst : brn gy to y gy, carb, mic, cem, l, lam, kln		063-1
			15	Sltst : brn gy to brn blk, carb, cly, mic		063-2
	2.06		15	Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx		063-3
			tr	Coal : blk		063-4
3229.00				Stat L.Ju/Hett-E.Plie		064
	0.21		90	S/Sst : w to y gy, mic, crs, l		064-1
			5	Coal : blk		064-2
			5	Sh/Clst: brn gy to brn blk, carb, slt, mic		064-3

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3241.00				Stat L.Ju/Hett-E.Plie		065
	57.34			60 S/Sst : w to y gy, mic, crs, l		065-1
				30 Coal : blk		065-2
				10 Sh/Clst: brn gy to brn blk, carb, slt, mic, wx		065-3
3253.00				Stat L.Ju/Hett-E.Plie		066
				80 S/Sst : w to y gy, mic, crs, l		066-1
	2.13			10 Coal : blk		066-2
				10 Sh/Clst: brn gy to brn blk, carb, slt, mic, wx		066-3
				tr Cont : prp, dd		066-4
3265.00				Stat L.Ju/Hett-E.Plie		067
				95 S/Sst : w to y gy, mic, crs, l		067-1
				5 Coal : blk		067-2
				tr Sh/Clst: brn gy to brn blk, carb, slt, mic, wx		067-3
3280.00				Stat L.Ju/Hett-E.Plie		068
	6.60			65 S/Sst : w to y gy, mic, crs, l		068-1
				25 Sh/Clst: brn gy to brn blk, carb, slt, mic, wx		068-3
				5 Coal : blk		068-2
				5 Cont : prp, dd		068-4
3289.00				Stat L.Ju/Hett-E.Plie		069
				80 S/Sst : w to y gy, mic, crs, l		069-1
				15 Sh/Clst: brn gy to brn blk, carb, slt, mic, wx		069-3
				5 Coal : blk		069-2

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3301.00				Stat L.Ju/Hett-E.Plie		070
				90 S/Sst : y gy, mic, l		070-1
				10 Sh/Clst: m drk gy, mic		070-2
3313.00				Stat L.Ju/Hett-E.Plie		071
	0.11			70 S/Sst : w to y gy, carb, mic, crs, l, kln		071-1
				15 Sltst : brn gy to brn blk, carb, cly, mic		071-2
				10 Sh/Clst: brn gy to ol gy, carb, wx		071-3
				5 Coal : blk, wx		071-4
3325.00				Stat L.Ju/Hett-E.Plie		072
	63.57			50 S/Sst : w to y gy, mic, l, kln		072-1
				30 Coal : blk, wx		072-3
				15 Sh/Clst: brn gy to brn blk, ol gy, slt, mic, wx		072-2
				5 Sh/Clst: dsk brn		072-5
				tr Sltst : brn gy, mic		072-4
3337.00				Stat L.Ju/Hett-E.Plie		074
	0.50			75 S/Sst : w to y gy, mic, l, kln		074-1
				15 Sh/Clst: brn gy to brn blk, lt ol gy, carb, slt, mic, wx		074-3
				10 Sh/Clst: gn gy to m brn, slt, mic, wx		074-2
3349.00				Stat L.Ju/Hett-E.Plie		073
				50 S/Sst : w to y gy, mic, l, kln		073-1
				40 Cont : prp, dd		073-3
	cvd			10 Sh/Clst: brn gy to brn blk, ol gy, dsk brn, slt, mic, wx		073-2

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3361.00				Stat L.Ju/Hett-E.Plie		075
				50 S/Sst : w to y gy, l		075-2
				30 Cont : dd		075-1
				20 Sh/Clst: brn gy to brn blk, lt ol gy, carb, slt, mic, wx		075-3
3373.00				Stat L.Ju/Hett-E.Plie		076
				65 S/Sst : w to y gy, l		076-1
	1.18			25 Sh/Clst: gy blk, brn gy to brn blk, lt ol gy, carb, slt, mic, wx		076-2
				5 Coal : blk		076-3
				5 Sh/Clst: gn gy, m brn		076-4
3388.00				Stat L.Ju/Hett-E.Plie		077
	1.08			85 S/Sst : w to y gy, mic, l		077-1
				5 Sh/Clst: gn gy to m brn		077-2
				5 Sh/Clst: brn gy to brn blk, lt ol gy, carb, slt, mic, wx		077-3
				5 Coal : blk		077-4
3397.00				Stat Tria		078
				40 Sh/Clst: gn gy, m brn to dsk brn, slt, mic		078-3
				30 S/Sst : w to y gy, l, kln		078-1
				25 Sh/Clst: brn gy to brn blk, lt ol gy, slt, mic		078-4
				5 Coal : blk		078-2
3421.00				Stat Tria		079
	0.12			60 Sh/Clst: gn gy, m brn to dsk brn, slt, mic, wx		079-2
				30 S/Sst : w to y gy, carb, mic, l, kln		079-1
				10 Sh/Clst: brn gy to brn blk, lt ol gy, carb, slt, mic, wx		079-3
				tr Cont : cem, prp		079-4

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample	
Int Cvd	TOC%	%	Lithology description				
3445.00			Stat Tria				080
			40	S/Sst	: w to y gy, mic, l, kln		080-1
			40	Sh/Clst:	gn gy, m brn to dsk brn, slt, mic		080-3
			10	Other	: kln		080-2
			5	Sh/Clst:	brn gy to brn blk, lt ol gy, slt, mic		080-4
			5	Coal	: blk		080-5
3457.00			Stat Tria				081
			40	S/Sst	: w to y gy, mic, l, kln		081-1
	0.18		40	Sh/Clst:	gn gy, m brn to dsk brn, slt, mic		081-3
			10	Other	: kln		081-2
			5	Sh/Clst:	brn gy to brn blk, lt ol gy, slt, mic		081-4
			5	Coal	: blk		081-5
3463.00			Stat Tria				082
			70	S/Sst	: w to y gy, mic, l		082-1
			20	Sh/Clst:	gn gy, m brn to dsk brn, slt, mic, wx		082-2
			5	Sh/Clst:	brn gy to brn blk, lt ol gy, carb, slt, mic, wx		082-3
			5	Coal	: blk		082-4
3487.00			Hegr	Tria			083
			70	S/Sst	: w to y gy, mic, l		083-1
			20	Sh/Clst:	gn gy, m brn to dsk brn, slt, mic, wx		083-2
			5	Sh/Clst:	brn gy to brn blk, lt ol gy, carb, slt, mic, wx		083-3
			5	Coal	: blk		083-4

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3493.00			Hegr	Tria		084
	0.54		50	Sh/Clst: gn gy, m brn to dsk brn, slt, mic, wx		084-2
			30	S/Sst : w to y gy, mic, l, kln		084-1
			20	Sh/Clst: brn blk, ol gy, m drk gy, carb, slt, mic		084-3
			tr	Coal : blk		084-4
			tr	Cont : prp		084-5
3505.00			Hegr	Tria		085
			50	S/Sst : w to y gy, mic, l, kln		085-1
			35	Sh/Clst: gn gy, m brn to dsk brn, slt, mic, wx		085-2
			10	Sh/Clst: brn gy to brn blk, ol gy to lt ol gy, m drk gy, carb, slt, mic		085-3
			5	Coal : blk		085-4
3514.00			Hegr	Tria		086
			60	S/Sst : w to y gy, mic, l, kln		086-1
			35	Sh/Clst: gn gy, m brn to dsk brn, slt, mic		086-2
			5	Sh/Clst: brn blk, lt ol gy, m drk gy, carb, slt, mic		086-3
			tr	Coal : blk		086-4
3529.00			Hegr	Tria		087
			40	S/Sst : w to y gy, mic, l, kln		087-1
			40	Sh/Clst: gn gy, m brn, dsk brn, slt, mic		087-3
	0.69		15	Sh/Clst: brn blk, lt ol gy, m drk gy, carb, slt, mic		087-4
			5	Sltst : gy pi to brn gy, mic		087-2
			tr	Coal : blk		087-5

Table 1 : Lithology description for well NOCS 30/6-5

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
3538.00			Hegr	Tria		088
	0.20		55	S/Sst : w to y gy, mic, l, kln		088-1
			30	Sh/Clst: gn gy, m brn, dsk brn, slt, mic		088-3
			10	Sh/Clst: brn blk, lt ol gy, m drk gy, carb, slt, mic		088-4
			5	Coal : blk		088-5
			tr	Sltst : gy pi to brn gy, mic		088-2
			tr	Cont : prp		088-6
3547.00			Hegr	Tria		089
			55	S/Sst : w to y gy, mic, l, kln		089-1
			30	Sh/Clst: gn gy, m brn, dsk brn, slt, mic		089-3
			10	Sh/Clst: brn blk, lt ol gy, m drk gy, carb, slt, mic		089-4
			5	Coal : blk		089-5
			tr	Sltst : gy pi to brn gy, mic		089-2
			tr	Cont : prp		089-6

Table 2 : Rock-Eval table for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
2437.00	cut	Sh/Clst: brn gy, ol gy, m gy	0.07	0.21	0.27	0.78	0.45	47	60	0.3	0.25	427	020-1
2452.00	cut	Sh/Clst: ol gy to lt ol gy, m lt gy to m drk gy	0.06	0.21	0.31	0.68	0.49	43	63	0.3	0.22	427	022-2
2458.00	cut	Sh/Clst: brn blk	1.12	32.09	0.62	51.76	5.98	537	10	33.2	0.03	421	023-4
2461.00	cut	Sh/Clst: brn blk	1.15	27.84	0.89	31.28	5.46	510	16	29.0	0.04	424	024-4
2470.00	cut	Sh/Clst: brn blk	1.34	30.76	1.00	30.76	5.98	514	17	32.1	0.04	422	025-4
2473.00	cut	Sh/Clst: ol gy, m gy to m drk gy	0.03	0.15	0.28	0.54	0.20	75	140	0.2	0.17	425	026-3
2485.00	cut	Sh/Clst: brn blk	1.29	23.63	0.79	29.91	5.09	464	16	24.9	0.05	423	027-4
2497.00	cut	Sh/Clst: brn blk	1.29	23.40	1.12	20.89	4.99	469	22	24.7	0.05	421	028-4
2512.00	cut	Sh/Clst: brn blk	3.21	43.54	1.73	25.17	7.67	568	23	46.8	0.07	423	029-4
2521.00	cut	Sh/Clst: brn blk to ol blk	1.87	30.08	1.14	26.39	5.87	512	19	32.0	0.06	423	030-4
2533.00	cut	Sh/Clst: brn blk to ol blk	1.74	29.50	1.39	21.22	6.10	484	23	31.2	0.06	424	031-1
2545.00	cut	Sltst : brn blk	1.28	25.37	1.62	15.66	5.87	432	28	26.7	0.05	423	032-1
2557.00	cut	Sltst : brn blk	1.35	23.41	1.51	15.50	5.07	462	30	24.8	0.05	424	033-1
2563.00	cut	Sltst : brn blk to ol blk	1.39	21.35	1.33	16.05	4.65	459	29	22.7	0.06	425	034-1
2581.00	cut	Sltst : brn blk to ol blk	2.35	34.06	1.32	25.80	5.79	588	23	36.4	0.06	425	035-1

Table 2 : Rock-Eval table for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
2599.00	cut	Sltst : brn blk to ol blk	0.66	12.70	1.43	8.88	3.50	363	41	13.4	0.05	425	036-1
2605.00	cut	Sh/Clst: brn blk	1.18	16.98	1.72	9.87	4.93	344	35	18.2	0.06	423	037-2
2617.00	cut	Sltst : brn blk	1.07	19.39	1.39	13.95	4.63	419	30	20.5	0.05	425	038-2
2641.00	cut	Sltst : brn blk	0.73	11.09	1.32	8.40	3.74	297	35	11.8	0.06	426	040-2
2653.00	cut	Sh/Clst: ol gy, lt gy to lt ol gy, m gy	0.02	0.18	0.50	0.36	0.63	29	79	0.2	0.10	423	041-3
2665.00	cut	Sltst : brn blk	0.85	20.89	0.71	29.42	5.04	414	14	21.7	0.04	421	042-1
2677.00	cut	Sltst : brn blk	0.88	10.76	0.52	20.69	5.13	210	10	11.6	0.08	427	043-1
2689.00	cut	Sh/Clst: ol gy, lt gy, lt ol gy, m gy	0.02	0.22	0.38	0.58	0.57	39	67	0.2	0.08	425	044-2
2701.00	cut	Sltst : brn blk	1.03	13.93	0.73	19.08	4.81	290	15	15.0	0.07	426	045-1
2713.00	cut	Sltst : brn gy to y gy	0.16	1.16	0.91	1.27	0.95	122	96	1.3	0.12	431	090-1
2722.00	cut	Sh/Clst: ol blk, m lt gy to m drk gy	0.15	2.41	0.37	6.51	1.29	187	29	2.6	0.06	425	091-3
2734.00	cut	Sltst : brn gy to y gy	0.51	4.64	0.40	11.60	1.51	307	26	5.2	0.10	430	092-1
2746.00	cut	Sltst : brn gy	0.54	3.91	0.49	7.98	1.51	259	32	4.5	0.12	433	093-1
2764.00	cut	Sh/Clst: blk, brn blk, ol blk	0.83	16.13	0.89	18.12	4.15	389	21	17.0	0.05	425	094-1

Table 2 : Rock-Eval table for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
2773.00	cut	Sltst : brn gy to lt brn gy	0.14	1.04	0.52	2.00	0.81	128	64	1.2	0.12	436	095-1
2773.00	cut	Sh/Clst: lt ol gy to m drk gy	0.04	0.39	0.33	1.18	0.75	52	44	0.4	0.09	426	095-4
2785.00	cut	Sltst : brn gy to lt brn gy	0.20	1.91	0.49	3.90	1.19	161	41	2.1	0.09	434	096-1
2797.00	cut	Sh/Clst: brn gy to lt brn gy	0.03	0.08	0.21	0.38	0.10	80	210	0.1	0.27	469	097-1
2803.00	cut	Sh/Clst: pu, brn gy, gn gy, ol gy, m gy, m brn	0.02	0.21	0.36	0.58	0.47	45	77	0.2	0.09	428	098-1
2857.00	cut	Coal : blk	9.80	107.11	1.15	93.14	40.41	265	3	116.9	0.08	432	102-1
2866.00	cut	Coal : blk	14.78	125.65	3.04	41.33	51.00	246	6	140.4	0.11	433	103-2
2953.00	cut	S/Sst : y gy	0.13	0.20	0.67	0.30	0.18	111	372	0.3	0.39	402	104-1
2965.00	cut	Sltst : brn gy	0.49	2.68	0.97	2.76	1.84	146	53	3.2	0.15	435	105-2
2977.00	cut	Sltst : brn gy	0.36	2.28	0.94	2.43	1.52	150	62	2.6	0.14	437	106-2
2986.00	cut	Sltst : brn gy to brn blk	0.32	2.27	0.59	3.85	1.34	169	44	2.6	0.12	436	107-1
3013.00	cut	S/Sst : y gy to lt brn gy	0.04	0.09	0.11	0.82	0.11	82	100	0.1	0.31	435	048-1
3025.00	cut	Sh/Clst: brn gy to brn blk, ol gy	1.08	7.43	0.23	32.30	1.85	402	12	8.5	0.13	436	049-2
3037.00	cut	Sh/Clst: brn gy to brn blk, ol gy	1.17	7.72	0.48	16.08	1.90	406	25	8.9	0.13	437	050-2
3049.00	cut	Sltst : brn gy to y gy	0.54	3.43	-	-	1.14	301	-	4.0	0.14	432	051-2

Table 2 : Rock-Eval table for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
3061.00	cut	Sh/Clst: brn gy to brn blk, ol gy	1.17	7.74	0.08	96.75	1.86	416	4	8.9	0.13	435	052-3
3097.00	cut	S/Sst : w, brn gy, y gy	0.16	0.33	0.17	1.94	0.32	103	53	0.5	0.33	441	055-1
3127.00	cut	Sltst : brn gy to brn blk	0.68	3.12	0.29	10.76	1.67	187	17	3.8	0.18	439	057-2
3127.00	cut	Sh/Clst: brn gy to brn blk	0.55	5.35	0.28	19.11	2.36	227	12	5.9	0.09	439	057-3
3139.00	cut	S/Sst : brn gy to y gy	0.08	0.26	0.13	2.00	0.30	87	43	0.3	0.24	434	058-1
3145.00	cut	Sh/Clst: brn gy to brn blk, ol gy	0.37	2.18	0.36	6.06	1.11	196	32	2.6	0.15	441	059-3
3157.00	cut	Sltst : brn gy to brn blk	0.33	2.14	-	-	1.03	208	-	2.5	0.13	440	060-2
3157.00	cut	Sh/Clst: brn gy to brn blk, ol gy	0.31	1.17	-	-	0.84	139	-	1.5	0.21	439	060-3
3184.00	cut	Sltst : brn gy to brn blk	0.47	2.39	-	-	1.12	213	-	2.9	0.16	439	061-2
3205.00	cut	Sh/Clst: brn gy to brn blk, ol gy	0.50	5.55	0.11	50.45	2.06	269	5	6.1	0.08	434	063-3
3229.00	cut	S/Sst : w to y gy	0.07	0.30	-	-	0.21	143	-	0.4	0.19	435	064-1
3241.00	cut	Coal : blk	17.85	211.78	2.85	74.31	57.34	369	5	229.6	0.08	437	065-2
3253.00	cut	Sh/Clst: brn gy to brn blk	0.95	4.61	0.30	15.37	2.13	216	14	5.6	0.17	438	066-3
3280.00	cut	Sh/Clst: brn gy to brn blk	2.05	15.53	0.90	17.26	6.60	235	14	17.6	0.12	438	068-3
3313.00	cut	S/Sst : w to y gy	0.07	0.09	0.28	0.32	0.11	82	255	0.2	0.44	423	071-1

Table 2 : Rock-Eval table for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
3325.00	cut	Coal : blk	12.59	264.81	2.59	102.24	63.57	417	4	277.4	0.05	435	072-3
3337.00	cut	S/Sst : w to y gy	0.13	0.33	0.13	2.54	0.50	66	26	0.5	0.28	444	074-1
3373.00	cut	Sh/Clst: gy blk, brn gy to brn blk, lt ol gy	1.58	2.99	0.33	9.06	1.18	253	28	4.6	0.35	439	076-2
3388.00	cut	S/Sst : w to y gy	0.40	0.92	5.40	0.17	1.08	85	500	1.3	0.30	394	077-1
3421.00	cut	Sh/Clst: gn gy, m brn to dsk brn	0.22	0.09	0.22	0.41	0.12	75	183	0.3	0.71	299	079-2
3457.00	cut	Sh/Clst: gn gy, m brn to dsk brn	0.07	-	0.09	-	0.18	-	50	0.1	1.00	227	081-3
3493.00	cut	Sh/Clst: gn gy, m brn to dsk brn	1.47	1.31	0.21	6.24	0.54	243	39	2.8	0.53	360	084-2
3529.00	cut	Sh/Clst: brn blk, lt ol gy, m drk gy	0.27	0.99	0.39	2.54	0.69	143	57	1.3	0.21	438	087-4
3538.00	cut	Sh/Clst: gn gy, m brn, dsk brn	0.15	0.13	0.13	1.00	0.20	65	65	0.3	0.54	377	088-3

Table 3 a: Weight of EOM and Chromatographic Fraction for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	Rock Extracted (g)	EOM (mg)	Sat (mg)	Aro (mg)	Asph (mg)	NSO (mg)	HC (mg)	Non-HC (mg)	TOC(e) (%)	Sample
2470.00	com *	Composite sample - see table 3 e *	2.5	19.6	4.2	3.4	0.4	11.6	7.6	12.0	8.00	108-0
2512.00	com *	Composite sample - see table 3 e *	4.8	34.1	6.4	0.6	1.8	25.3	7.0	27.1	8.30	109-0
2533.00	com *	Composite sample - see table 3 e *	10.0	36.3	7.7	7.8	1.8	19.0	15.5	20.8	8.60	110-0
2557.00	com *	Composite sample - see table 3 e *	4.1	23.0	5.6	5.7	0.9	10.8	11.3	11.7	7.50	111-0
2581.00	com *	Composite sample - see table 3 e *	4.3	25.3	10.5	7.2	1.2	6.4	17.7	7.6	8.00	112-0
2641.00	com *	Composite sample - see table 3 e *	3.3	13.2	4.0	3.4	0.6	5.2	7.4	5.8	6.10	113-0
2701.00	com *	Composite sample - see table 3 e *	1.5	12.2	2.3	1.5	0.5	7.9	3.8	8.4	7.30	114-0
2785.00	com *	Composite sample - see table 3 e *	3.8	4.7	0.8	0.7	0.1	3.1	1.5	3.2	1.30	115-0
2866.00	com *	Composite sample - see table 3 e *	0.8	26.0	2.7	4.6	9.3	9.4	7.3	18.7	40.20	116-0
2986.00	com *	Composite sample - see table 3 e *	1.7	4.9	2.9	1.7	0.1	0.2	4.6	0.3	1.78	117-0
3061.00	com *	Composite sample - see table 3 e *	4.9	15.7	5.2	4.1	0.2	6.2	9.3	6.4	2.32	118-0
3205.00	com *	Composite sample - see table 3 e *	0.9	3.1	1.4	1.3	-	0.4	2.7	0.4	2.12	120-0

Table 3 b: Concentration of EOM and Chromatographic Fraction (wt ppm rock) for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
2470.00	com	* Composite sample - see table 3 e *	7840	1680	1360	160	4640	3040	4800	108-0
2512.00	com	* Composite sample - see table 3 e *	7045	1322	123	371	5227	1446	5599	109-0
2533.00	com	* Composite sample - see table 3 e *	3629	770	780	179	1900	1550	2080	110-0
2557.00	com	* Composite sample - see table 3 e *	5555	1352	1376	217	2608	2729	2826	111-0
2581.00	com	* Composite sample - see table 3 e *	5829	2419	1658	276	1474	4078	1751	112-0
2641.00	com	* Composite sample - see table 3 e *	3975	1204	1024	180	1566	2228	1746	113-0
2701.00	com	* Composite sample - see table 3 e *	7973	1503	980	326	5163	2483	5490	114-0
2785.00	com	* Composite sample - see table 3 e *	1246	212	185	26	822	397	848	115-0
2866.00	com	* Composite sample - see table 3 e *	34210	3552	6052	12236	12368	9605	24605	116-0
2986.00	com	* Composite sample - see table 3 e *	2832	1676	982	57	115	2658	173	117-0
3061.00	com	* Composite sample - see table 3 e *	3178	1052	829	40	1255	1882	1295	118-0
3205.00	com	* Composite sample - see table 3 e *	3297	1489	1382	-	425	2872	425	120-0

Table 3 c: Concentration of EOM and Chromatographic Fraction (mg/g TOC(e)) for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
2470.00	com	* Composite sample - see table 3 e *	98.00	21.00	17.00	2.00	58.00	38.00	60.00	108-0
2512.00	com	* Composite sample - see table 3 e *	84.88	15.93	1.49	4.48	62.98	17.43	67.46	109-0
2533.00	com	* Composite sample - see table 3 e *	42.21	8.95	9.07	2.09	22.09	18.02	24.19	110-0
2557.00	com	* Composite sample - see table 3 e *	74.07	18.04	18.36	2.90	34.78	36.39	37.68	111-0
2581.00	com	* Composite sample - see table 3 e *	72.87	30.24	20.74	3.46	18.43	50.98	21.89	112-0
2641.00	com	* Composite sample - see table 3 e *	65.18	19.75	16.79	2.96	25.68	36.54	28.64	113-0
2701.00	com	* Composite sample - see table 3 e *	109.23	20.59	13.43	4.48	70.73	34.02	75.21	114-0
2785.00	com	* Composite sample - see table 3 e *	95.90	16.32	14.28	2.04	63.25	30.61	65.29	115-0
2866.00	com	* Composite sample - see table 3 e *	85.10	8.84	15.06	30.44	30.77	23.89	61.21	116-0
2986.00	com	* Composite sample - see table 3 e *	159.12	94.17	55.21	3.25	6.49	149.38	9.74	117-0
3061.00	com	* Composite sample - see table 3 e *	136.99	45.37	35.77	1.75	54.10	81.15	55.84	118-0
3205.00	com	* Composite sample - see table 3 e *	155.56	70.25	65.23	-	20.07	135.49	20.07	120-0

Table 3 d: Composition of material extracted from the rock (%) for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	Sat	Aro	Asph	NSO	HC	Non-HC	Sat	HC	Sample
			EOM	EOM	EOM	EOM	EOM	EOM	EOM	Aro	
2470.00	com	* Composite sample - see table 3 e *	21.43	17.35	2.04	59.18	38.78	61.22	123.53	63.33	108-0
2512.00	com	* Composite sample - see table 3 e *	18.77	1.76	5.28	74.19	20.53	79.47	*****	25.83	109-0
2533.00	com	* Composite sample - see table 3 e *	21.21	21.49	4.96	52.34	42.70	57.30	98.72	74.52	110-0
2557.00	com	* Composite sample - see table 3 e *	24.35	24.78	3.91	46.96	49.13	50.87	98.25	96.58	111-0
2581.00	com	* Composite sample - see table 3 e *	41.50	28.46	4.74	25.30	69.96	30.04	145.83	232.89	112-0
2641.00	com	* Composite sample - see table 3 e *	30.30	25.76	4.55	39.39	56.06	43.94	117.65	127.59	113-0
2701.00	com	* Composite sample - see table 3 e *	18.85	12.30	4.10	64.75	31.15	68.85	153.33	45.24	114-0
2785.00	com	* Composite sample - see table 3 e *	17.02	14.89	2.13	65.96	31.91	68.09	114.29	46.88	115-0
2866.00	com	* Composite sample - see table 3 e *	10.38	17.69	35.77	36.15	28.08	71.92	58.70	39.04	116-0
2986.00	com	* Composite sample - see table 3 e *	59.18	34.69	2.04	4.08	93.88	6.12	170.59	*****	117-0
3061.00	com	* Composite sample - see table 3 e *	33.12	26.11	1.27	39.49	59.24	40.76	126.83	145.31	118-0
3205.00	com	* Composite sample - see table 3 e *	45.16	41.94	-	12.90	87.10	12.90	107.69	675.00	120-0

Depth unit of measure: m

NOTE: Depths shown in tables 3 a to d correspond to the composite samples' lower depth.

<u>Upper depth</u>	<u>Lower depth</u>	<u>Typ</u>	<u>Sample</u>		<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sample</u>
2458.00	2470.00	com	108-0	is composed of:	2458.00	cut	Sh/Clst: brn blk, carb, mic, wx	023-4
					2461.00	cut	Sh/Clst: brn blk, carb, mic, wx	024-4
					2470.00	cut	Sh/Clst: brn blk, carb, mic, wx	025-4
2485.00	2512.00	com	109-0	is composed of:	2485.00	cut	Sh/Clst: brn blk, carb, slt, mic	027-4
					2497.00	cut	Sh/Clst: brn blk, carb, slt, mic	028-4
					2512.00	cut	Sh/Clst: brn blk, carb, slt, mic	029-4
2521.00	2533.00	com	110-0	is composed of:	2521.00	cut	Sh/Clst: brn blk to ol blk, carb, slt, mic	030-4
					2533.00	cut	Sh/Clst: brn blk to ol blk, carb, slt, mic	031-1
2545.00	2557.00	com	111-0	is composed of:	2545.00	cut	Sltst : brn blk, carb, mic	032-1
					2557.00	cut	Sltst : brn blk, carb, mic	033-1
2563.00	2581.00	com	112-0	is composed of:	2563.00	cut	Sltst : brn blk to ol blk, carb, mic	034-1
					2581.00	cut	Sltst : brn blk to ol blk, carb, mic	035-1
2599.00	2641.00	com	113-0	is composed of:	2599.00	cut	Sltst : brn blk to ol blk, carb, mic	036-1
					2617.00	cut	Sltst : brn blk, carb, pyr, mic	038-2
					2641.00	cut	Sltst : brn blk, carb, mic	040-2

Depth unit of measure: m

NOTE: Depths shown in tables 3 a to d correspond to the composite samples' lower depth.

<u>Upper depth</u>	<u>Lower depth</u>	<u>Typ</u>	<u>Sample</u>		<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sample</u>
2665.00	2701.00	com	114-0	is composed of:	2665.00	cut	Sltst : brn blk, carb, mic	042-1
					2677.00	cut	Sltst : brn blk, carb, mic	043-1
					2701.00	cut	Sltst : brn blk, carb, slt, mic	045-1
2713.00	2785.00	com	115-0	is composed of:	2713.00	cut	Sltst : brn gy to y gy, calc, carb, s, mic, glauc, kln	090-1
					2734.00	cut	Sltst : brn gy to y gy, calc, carb, s, mic, glauc, kln	092-1
					2746.00	cut	Sltst : brn gy, carb, s, mic, glauc	093-1
					2773.00	cut	Sltst : brn gy to lt brn gy, calc, carb, s, mic, glauc	095-1
					2785.00	cut	Sltst : brn gy to lt brn gy, calc, s, mic	096-1
2857.00	2866.00	com	116-0	is composed of:	2857.00	cut	Coal : blk	102-1
					2866.00	cut	Coal : blk	103-2
2965.00	2986.00	com	117-0	is composed of:	2965.00	cut	Sltst : brn gy, carb, cly, mic	105-2
					2977.00	cut	Sltst : brn gy, carb, cly, mic	106-2
					2986.00	cut	Sltst : brn gy to brn blk, carb, cly, mic	107-1

Depth unit of measure: m

NOTE: Depths shown in tables 3 a to d correspond to the composite samples' lower depth.

<u>Upper depth</u>	<u>Lower depth</u>	<u>Typ</u>	<u>Sample</u>		<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sample</u>
3025.00	3061.00	com	118-0	is composed of:	3025.00	cut	Sh/Clst: brn gy to brn blk, ol gy, slt, mic	049-2
					3037.00	cut	Sh/Clst: brn gy to brn blk, ol gy, slt, mic	050-2
					3061.00	cut	Sh/Clst: brn gy to brn blk, ol gy, slt, mic	052-3
3127.00	3205.00	com	120-0	is composed of:	3127.00	cut	Sh/Clst: brn gy to brn blk, carb, mic	057-3
					3145.00	cut	Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx	059-3
					3157.00	cut	Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx	060-3
					3205.00	cut	Sh/Clst: brn gy to brn blk, ol gy, carb, mic, wx	063-3

Table 4 : Saturated Hydrocarbon Ratios for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	Pristane	Pristane	Pristane + Phytane	Phytane	CPI	Sample
			nC17	Phytane	nC17 + nC18	nC18		
2470.00	com	bulk	1.00	1.00	0.80	-	1.20	108-0
2512.00	com	bulk	1.00	1.30	0.80	-	1.10	109-0
2533.00	com	bulk	1.20	1.60	1.10	-	1.20	110-0
2557.00	com	bulk	1.20	1.60	1.00	-	1.20	111-0
2581.00	com	bulk	1.00	1.50	1.00	-	1.20	112-0
2641.00	com	bulk	1.20	1.70	0.80	-	1.30	113-0
2701.00	com	bulk	1.10	2.60	0.80	-	1.20	114-0
2785.00	com	bulk	0.90	2.70	0.70	-	1.20	115-0
2866.00	com	bulk	1.30	5.10	0.80	-	1.20	116-0
2986.00	com	bulk	0.60	2.50	0.50	-	1.20	117-0
3061.00	com	bulk	0.60	1.50	0.60	-	1.20	118-0
3205.00	com	bulk	0.40	2.20	0.30	-	1.30	120-0

Table 5 : Aromatic Hydrocarbon Ratios for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	MNR	DMNR	BPhR	2/1MP	MPI1	MPI2	DBT/P	4/1MDBT	(3+2)/1MDBT	Sample
2470.00	com	bulk	-	0.49	-	0.78	0.93	0.78	0.57	0.53	0.31	108-0
2533.00	com	bulk	0.80	0.78	0.13	0.84	0.90	0.80	0.61	0.31	0.23	110-0
2557.00	com	bulk	0.62	0.71	0.11	0.81	0.78	0.71	0.48	0.35	0.27	111-0
2581.00	com	bulk	0.80	0.71	0.09	0.83	0.77	0.77	0.32	0.44	0.28	112-0
2641.00	com	bulk	-	0.59	0.06	0.73	0.69	0.60	0.34	0.39	0.32	113-0
2701.00	com	bulk	-	-	-	0.59	0.47	0.43	0.12	0.89	0.71	114-0
2785.00	com	bulk	-	-	-	0.77	0.61	0.63	0.16	2.77	2.63	115-0
2866.00	com	bulk	-	0.54	0.09	0.64	0.56	0.65	0.15	0.70	0.47	116-0
2986.00	com	bulk	-	-	-	0.88	0.64	0.62	0.20	2.62	0.82	117-0
3061.00	com	bulk	-	0.49	-	0.94	0.70	0.77	0.16	12.54	1.63	118-0
3205.00	com	bulk	-	-	-	0.74	0.70	0.70	-	1.70	-	120-0

Table 6 : Thermal Maturity Data for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation	Spore Fluorescence Colour	SCI	T <sub>max</sub> (°C)	Sample
2005.00	cut bulk	0.44	3	0.12	4	-	-	005-0
2101.00	cut bulk	0.45	3	0.04	0	-	-	009-0
2197.00	cut bulk	0.52	4	0.04	4	-	-	012-0
2317.00	cut bulk	0.46	9	0.04	4	-	-	014-0
2413.00	cut bulk	0.50	10	0.06	4	-	-	018-0
2485.00	cut bulk	0.46	13	0.03	4+5	-	-	027-0
2512.00	cut Sh/Clst: brn blk	-	-	-	-	4.5	423	029-4
2533.00	cut Sh/Clst: brn blk to ol blk	-	-	-	-	4 - 4.5	424	031-1
2545.00	cut Sltst : brn blk	-	-	-	-	4	423	032-1
2563.00	cut bulk	0.51	15	0.06	5	-	-	034-0
2581.00	cut Sltst : brn blk to ol blk	-	-	-	-	4 - 4.5	425	035-1
2617.00	cut Sltst : brn blk	-	-	-	-	4.5	425	038-2
2641.00	cut bulk	0.53	10	0.06	5	-	-	040-0
2665.00	cut Sltst : brn blk	-	-	-	-	4.5?	421	042-1

Table 6 : Thermal Maturity Data for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation	Spore Fluorescence Colour	SCI	T <sub>max</sub> (°C)	Sample
2677.00	cut Sltst : brn blk	-	-	-	-	4.5	427	043-1
2722.00	cut bulk	0.51	11	0.04	5	-	-	091-0
2734.00	cut Sltst : brn gy to y gy	-	-	-	-	4.5 - 5 ?	430	092-1
2764.00	cut Sh/Clst: blk, brn blk, ol blk	-	-	-	-	4.5	425	094-1
2797.00	cut bulk	0.51	20	0.05	5	-	-	097-0
2857.00	cut bulk	0.66	26	0.05	5+6	-	-	102-0
2986.00	cut bulk	0.57	24	0.05	5+6	-	-	107-0
3037.00	cut Sh/Clst: brn gy to brn blk, ol gy	-	-	-	-	5 - 5.5 ?	437	050-2
3061.00	cut bulk	0.56	21	0.06	6	-	-	052-0
3127.00	cut Sh/Clst: brn gy to brn blk	-	-	-	-	5 - 5.5	439	057-3
3139.00	cut bulk	0.67	27	0.07	5+6	-	-	058-0
3241.00	cut bulk	0.69	41	0.05	6+7	-	-	065-0
3241.00	cut Coal : blk	-	-	-	-	6	437	065-2
3325.00	cut bulk	0.63	17	0.07	0	-	-	072-0

Table 6 : Thermal Maturity Data for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation	Spore Fluorescence Colour	SCI	T <sub>max</sub> (°C)	Sample
3325.00	cut Coal : blk	-	-	-	-	5 - 5.5	435	072-3
3373.00	cut Sh/Clst: gy blk, brn gy to brn blk, lt ol gy	-	-	-	-	5.5 - 6	439	076-2
3397.00	cut bulk	0.67	16	0.05	6	-	-	078-0
3487.00	cut bulk	0.63	18	0.03	6	-	-	083-0
3547.00	cut bulk	0.70	25	0.05	6+7	-	-	089-0

Table 7 : Visual Kerogen Composition Data for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	L	A	L	S	C	D	I	S	I	M	S	V	C	V	A	Sample
			P	m	i	p	u	R	A	N	F	n	c	B	T	T	e	
			T	r	D	P	i	s	g	o	r	t	R	i	u	e	n	I
			%	L	t	l	l	n	e	l	t	L	%	n	s	t	n	o
			%	L	t	l	l	n	e	l	t	L	%	n	s	t	n	o
2512.00	cut	Sh/Clst: brn blk	70	**	*	**			10	*	**	*		20		*	**	029-4
2533.00	cut	Sh/Clst: brn blk to ol blk	70	**	*	**			10	*	**	*		20		*	**	031-1
2545.00	cut	Sltst : brn blk	65	**	*	**			10	*	**	*		25		*	**	032-1
2581.00	cut	Sltst : brn blk to ol blk	75	**	*	**			10	*	**	*		15		*	**	035-1
2617.00	cut	Sltst : brn blk	60	*	*	**			15		*	*		25		*	**	038-2
2665.00	cut	Sltst : brn blk	60?	*	*	**			15?		*	*		25?		*	**	042-1
2677.00	cut	Sltst : brn blk	30		*	**			30	**	*			40		**	*	043-1
2734.00	cut	Sltst : brn gy to y gy	30?		*	**			20?	**	*			50?		**	*	092-1
2764.00	cut	Sh/Clst: blk, brn blk, ol blk	70	**	*	*			10	**	*			20		*	*	094-1
3037.00	cut	Sh/Clst: brn gy to brn blk, ol gy	90	*	*	**			5?		*			5?		*		050-2
3127.00	cut	Sh/Clst: brn gy to brn blk	30	*	*	**			20	*	**	*		50		*	**	057-3
3241.00	cut	Coal : blk	5			*			5		*			90		*		065-2
3325.00	cut	Coal : blk	5			*			5		*			90		*		072-3

Table 7 : Visual Kerogen Composition Data for well NOCS 30/6-5

Depth unit of measure: m

Depth	Typ	Lithology	L	A	L	S	C	D	I	S	I	M	S	V	C	V	A	Smple				
			%	L	t	l	l	n	e	l	t	L	%	n	s	t	n		o	I	%	n
3373.00	cut	Sh/Clst: gy blk, brn gy to brn blk, lt ol gy	15	*	**				15	?	*			70	*	**		076-2				

Table 8 WELL 30/6-5

PYROLYSIS GC ON NON-EXTRACTED ROCK. VALUES FROM S2 PEAK.

DEPTH (m)	% C1-C5 of total	% C6+ of total
=====		
2470	11	89
2485	15	85
2497	14	86
2512	11	89
2521	13	87
2533	12	88
2545	15	85
2557	12	88
2563	15	85
2581	12	88
2599	14	86
2605	16	84
2617	12	88
2641	18	82
2665	16	84
2677	15	85
2701	14	86
2722	5	95
2734	22	78
2764	13	87
2773	21	79
2785	40	60

Table 8 WELL 30/6-5

PYROLYSIS GC ON NON-EXTRACTED ROCK. VALUES FROM S2 PEAK.

DEPTH (m)	% C1-C5 of total	% C6+ of total
=====		
2857	21	79
2866	24	76
2965	29	71
2986	28	72
3025	17	83
3049	32	68
3061	17	83
3127 SLTST	11	89
3127 CLST	30	70
3145	34	66
3157	38	62
3184	31	69
3205	25	75
3241	37	63
3253	30	70
3280	22	78
3325	17	83
3373	32	68
3493	29	71

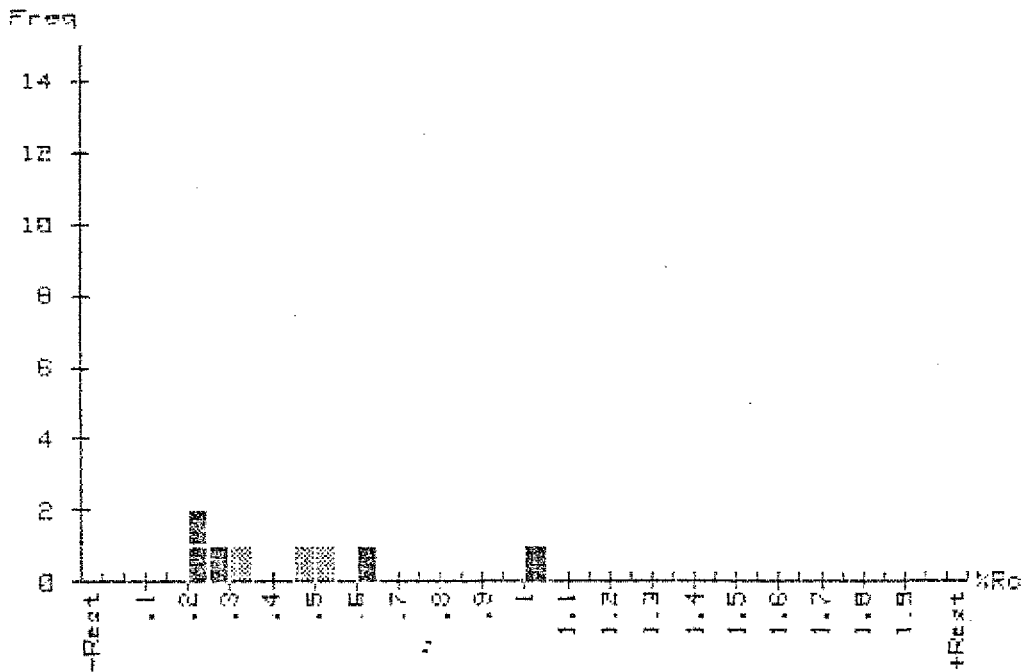
Table WELL 30/6-5

PYROLYSIS GC ON PRE-EXTRACTED ROCK. VALUES FROM S2 PEAK.

DEPTH (m)	% C1-C5 of total	% C6+ of total
=====		
2470	14	86
2512	14	86
2533	21	79
2547	22	78
2581	17	83
2641	19	81
2701	25	75
2785	32	68
2866	29	71
2986	34	66
3061	22	78
3205	35	65

Histogram of vitrinite reflectance measurements

Sample No.: 1502 1 101  
 Well Name: 130/8-5  
 Depth: 13005M  
 Analyst: U MC  
 Date: 12E 11 86



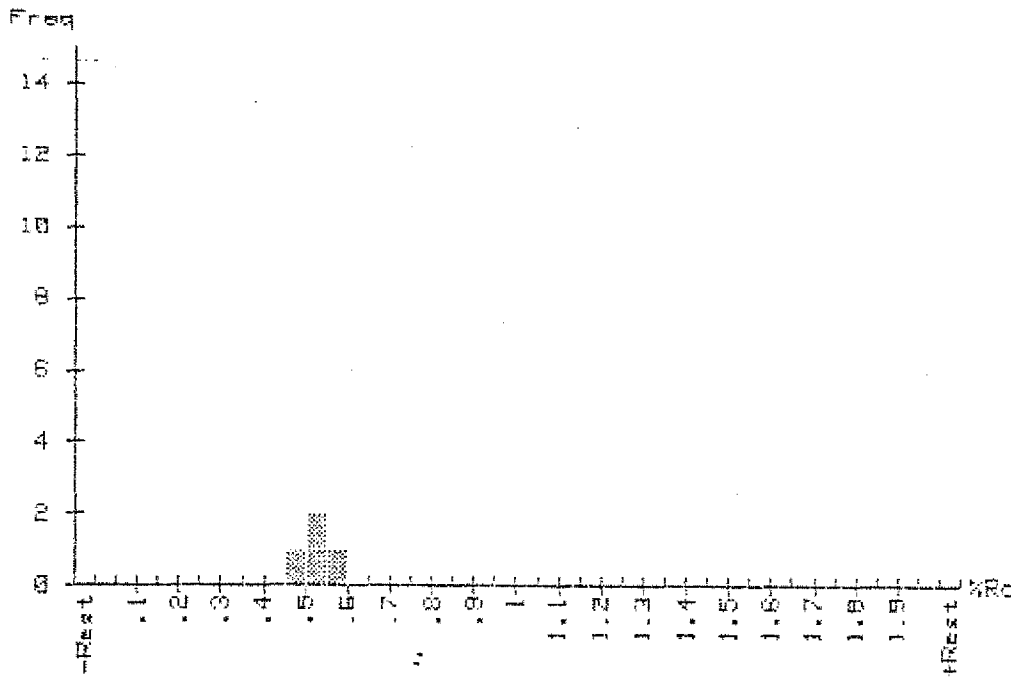
Pop.	From	to	Mean	St.D	Total
1	.18	.30	.24	.01	3
* Pop. 2	.30	.65	.44	.12	3
Pop. 3	.60	1.05	.82	.26	2

The indigenous Population is marked '\*'.

	1	2	3	4	5	6	7	8	9	10
0	.235	.244	.252	.307	.478	.530	.641	1.003		



Sample No.: 1504 1 101  
Well Name: 130/6-5  
Depth: 12197M  
Analyser: IJ MC  
Date: 128 11 88



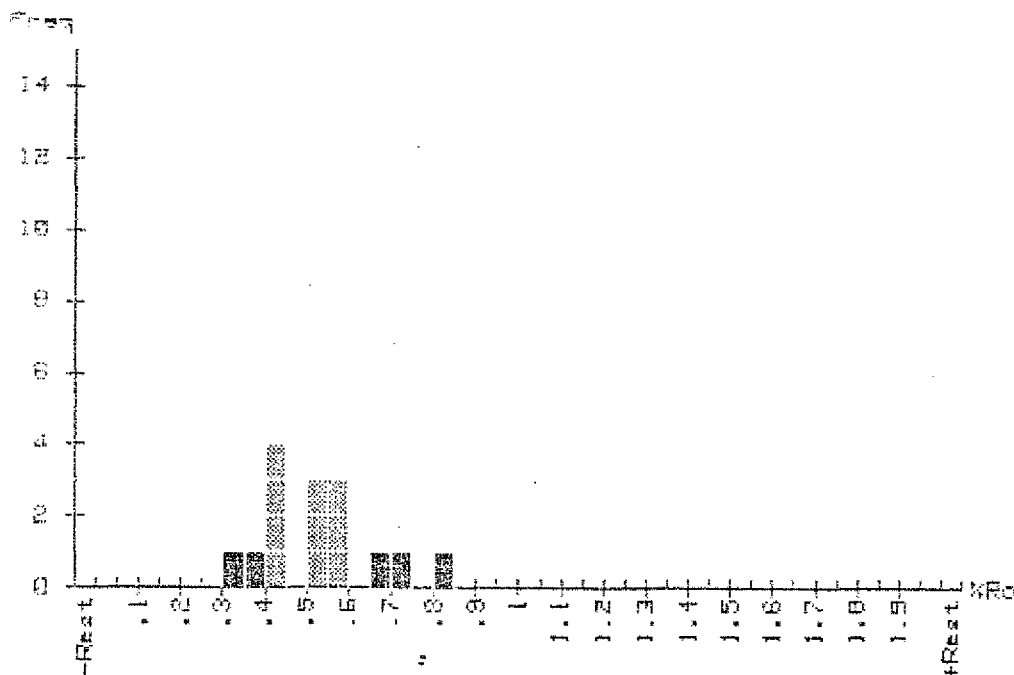
\* Pop. 1 From .45 to .60 Mean= .52 St.D= .04 Total= 4

The indigenous Population is marked '\*1'.

	1	2	3	4	5	6	7	8	9	10
0	1	.473	.521	.543	.550					



Sample No.: 1506 ( 101  
Well Name: 130/8-5  
Depth: 12413M  
Analyst: UJ MC  
Date: 129 11 88

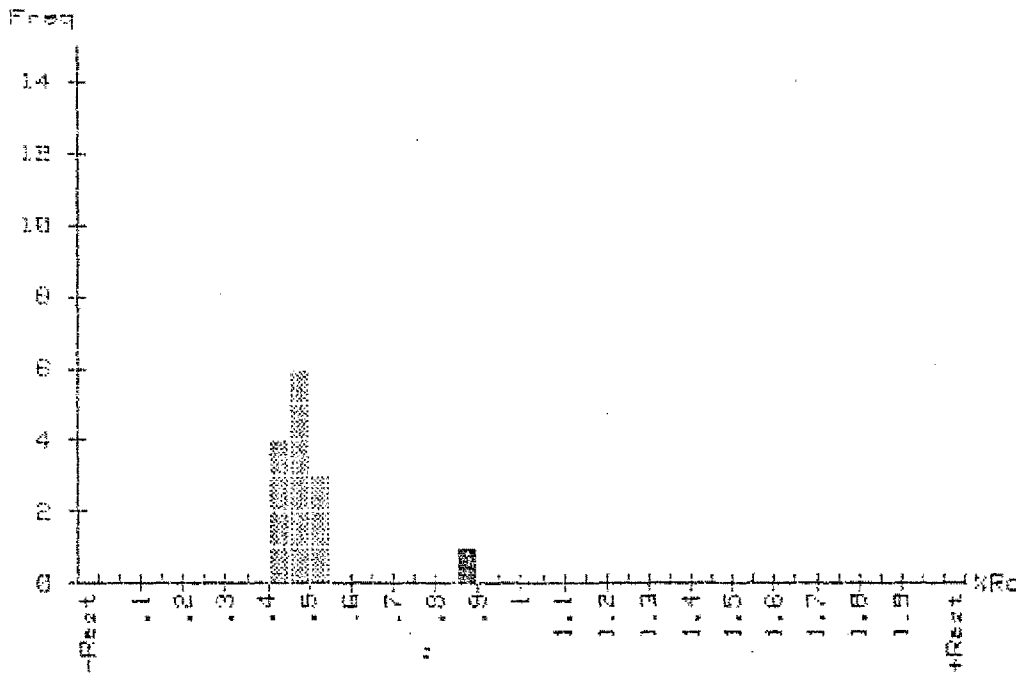


Pop. 1 From .30 to .40 Mean= .34 St.D= .03 Total= 2  
\* Pop. 2 From .40 to .60 Mean= .50 St.D= .05 Total= 10  
Pop. 3 From .60 to .65 Mean= .76 St.D= .08 Total= 3

The indigenous Population is marked '\*'.  
,

	1	2	3	4	5	6	7	8	9	10
0	.323	.360	.421	.433	.438	.448	.512	.517	.532	.561
10	.555	.599	.691	.732	.850					

Sample No.: 1567 1 101  
 Well Name: 130/6-5  
 Depth: 1246EM  
 Analyst: JJ MC  
 Date: 125 11 88

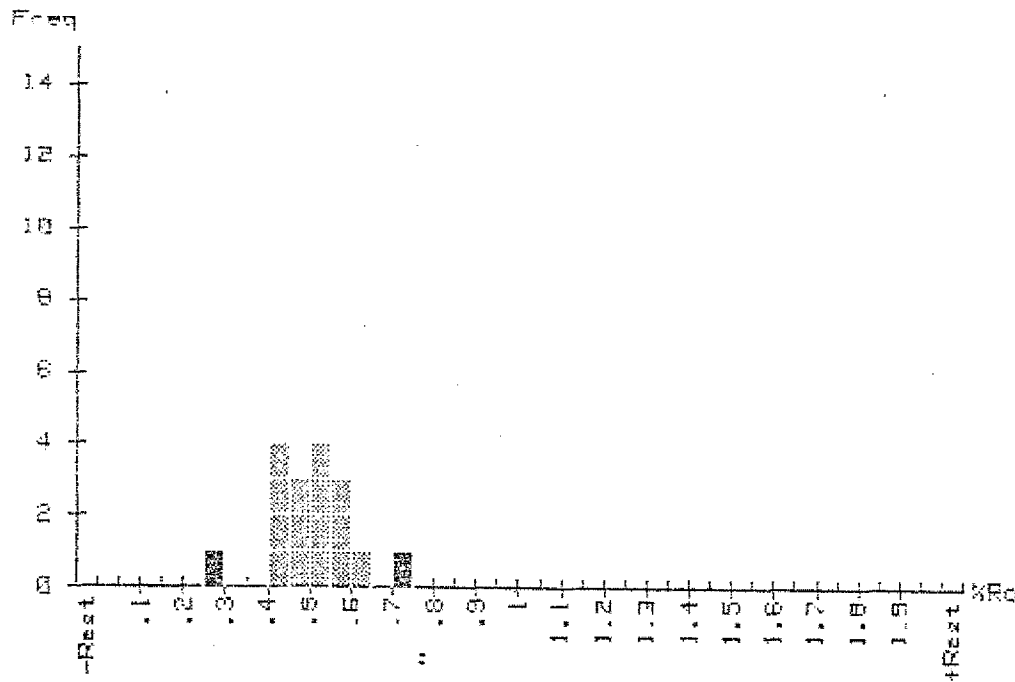


\* Pop. 1 From .40 to .65 Mean= .46 St.D= .03 Total= 13  
 Pop. 2 From .85 to .90 Total= 0

The indigenous Population is marked '\*').

	1	2	3	4	5	6	7	8	9	10
0	.412	.418	.425	.437	.454	.465	.483	.465	.471	.479
10	.500	.501	.504	.551						

Sample No.: 1509 1 10'  
Well Name: 13075-5  
Depth: 12563M  
Analyst: U MC  
Date: 125 11 86

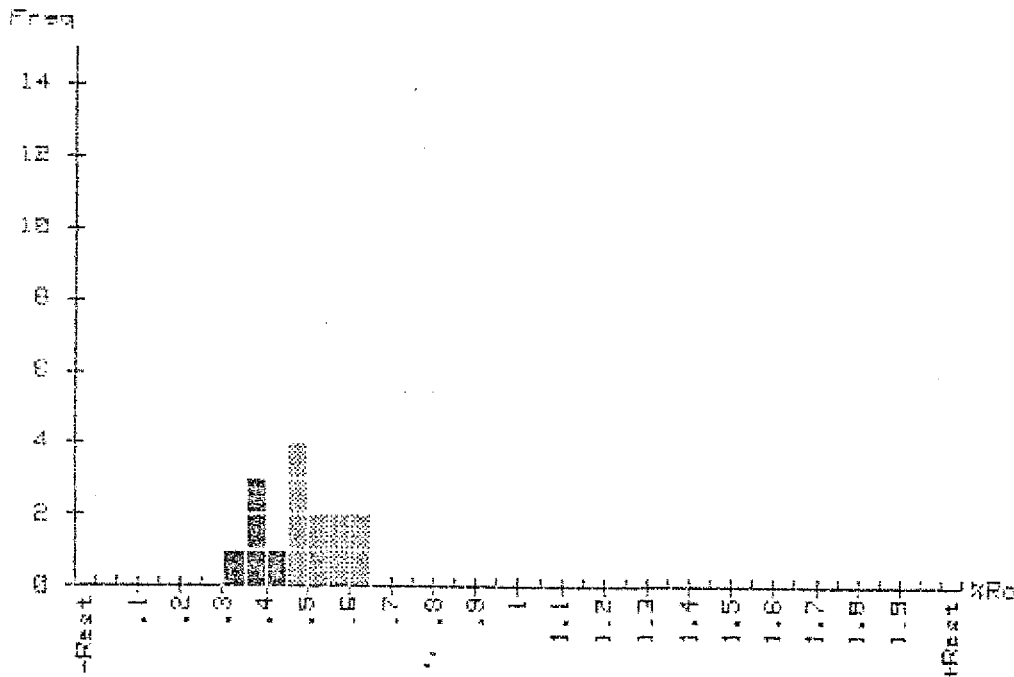


Pop. 1	From	.23	to	.30				Total#	1
* Pop. 2	From	.40	to	.55	Mean=	.51	St.D=	.08	Total# 15
Pop. 3	From	.70	to	.75				Total#	0

The indigenous Population is marked '\*'.

	1	2	3	4	5	6	7	8	9	10
0	.281	.422	.425	.447	.448	.475	.484	.497	.519	.530
10	.531	.549	.552	.572	.585	.632	.743			

Sample No.: 1509 1 101  
Well Name: 1507B-E  
Depth: 125.1M  
Analyst: JI MC  
Date: 12E 11 96

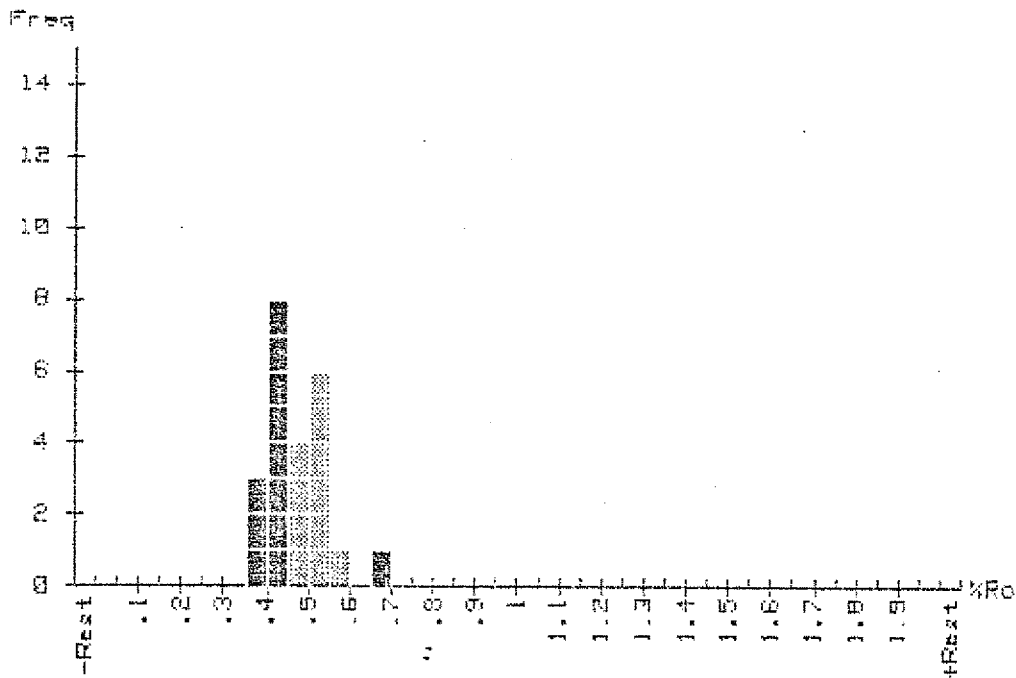


Pop. 1 From .30 to .45 Mean= .38 St.D= .03 Total= 5  
\* Pop. 2 From .45 to .65 Mean= .53 St.D= .06 Total= 10

The indigenous Population is marked '+'.  
\* = non indigenous

	1	2	3	4	5	6	7	8	9	10	
0	1	.344	.370	.394	.388	.426	.456	.461	.470	.480	.516
10	1	.525	.554	.585	.610	.613					

Sample No.: 1510 1 101  
Well Name: 130/6-5  
Depth: 12722M  
Analyst: IJ MC  
Date: 125 11 88

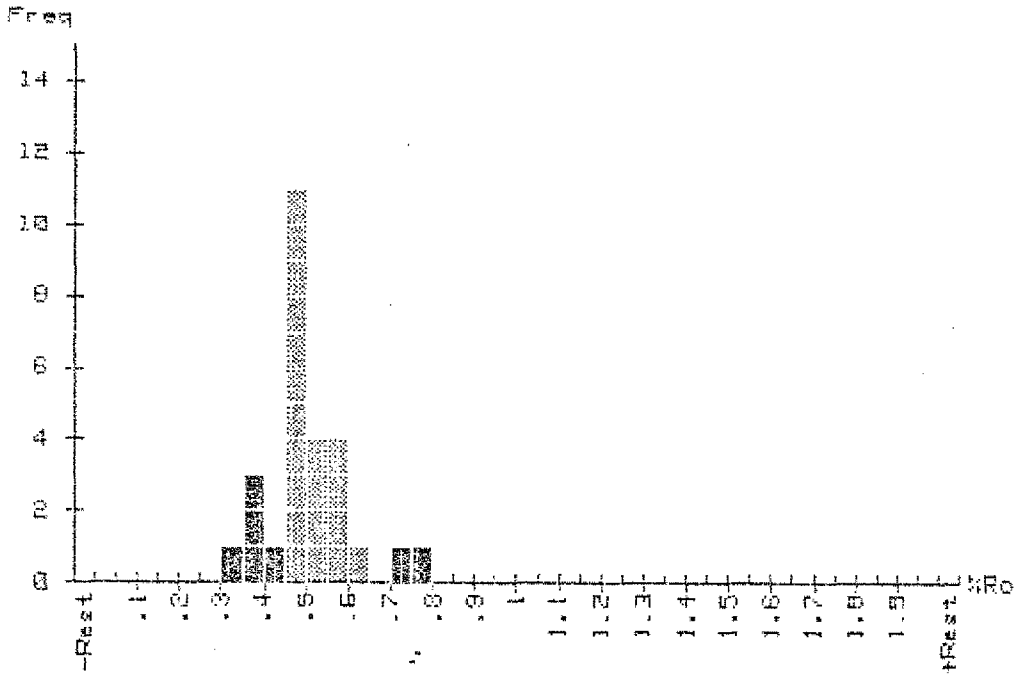


Pop.	From	to	Mean	St.D	Total
1	.35	.45	.42	.03	11
* Pop. 2	.45	.60	.51	.04	11
Pop. 3	.65	.70			0

The indigenous Population is marked '\*'.

	1	2	3	4	5	6	7	8	9	10
0	.379	.382	.384	.402	.425	.428	.439	.440	.445	.448
10	.448	.460	.450	.477	.479	.510	.519	.522	.538	.540
20	.542	.597	.574							

Sample No.: 1511 1 (D)  
Well Name: 1307B-E  
Depth: 12787M  
Analyst: JJ MC  
Date: 125 11 86

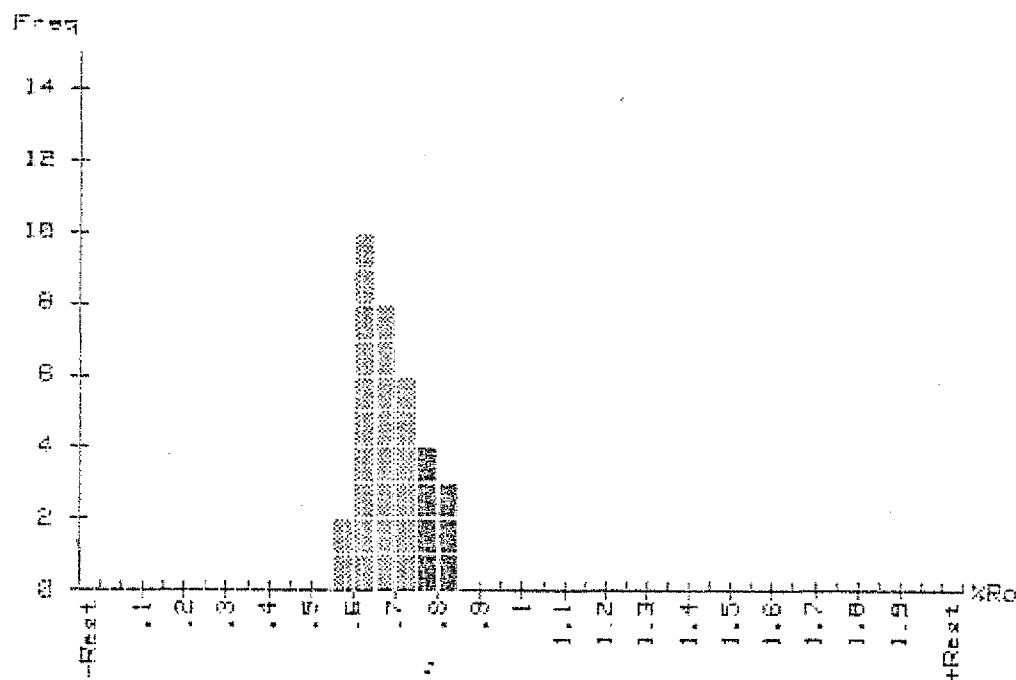


Pop. 1 From .30 to .45 Mean= .38 St.D= .04 Total= 5  
\* Pop. 2 From .45 to .65 Mean= .51 St.D= .05 Total= 20  
Pop. 3 From .70 to .80 Mean= .78 St.D= .05 Total= 2

The indigenous Population is marked '\*'.

	1	2	3	4	5	6	7	8	9	10
0	.338	.386	.392	.397	.441	.456	.456	.457	.461	.464
10	.473	.473	.478	.479	.488	.495	.523	.540	.541	.542
20	.554	.554	.568	.578	.608	.720	.795			

Sample No.: 1512 : 101  
 Well name: 13076-E  
 Depth: 12857M  
 Analyte: 17 MO  
 Date: 125 11 86

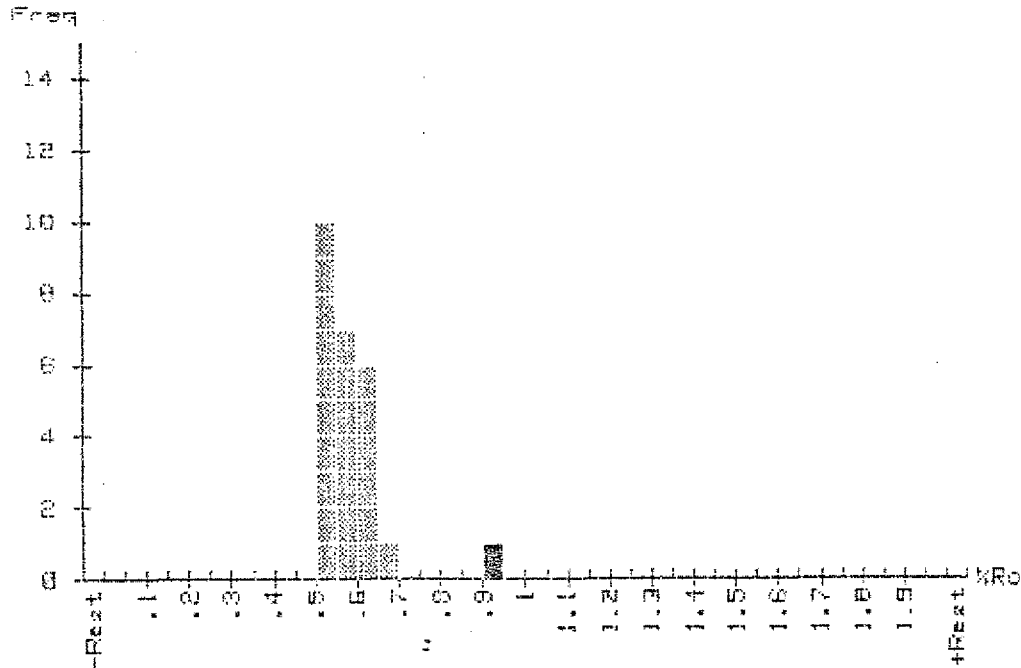


\* Pop. 1 From .55 to .75 Mean= .66 St.D= .05 Total= 26  
 + Pop. 2 From .75 to .85 Mean= .78 St.D= .03 Total= 7

The indigenous Population is marked '+'.  
 \* is the indigenous population

	1	2	3	4	5	6	7	8	9	10
0	.598	.598	.606	.606	.607	.616	.617	.625	.628	.634
10	.639	.649	.656	.657	.669	.670	.676	.682	.683	.691
20	.709	.711	.716	.735	.747	.748	.753	.757	.764	.766
30	.800	.816	.820							

Sample No.: 1517 : 101  
Well Name: 130/6-5  
Depth: 12986M  
Analyst: J. MC  
Date: 125 11 86

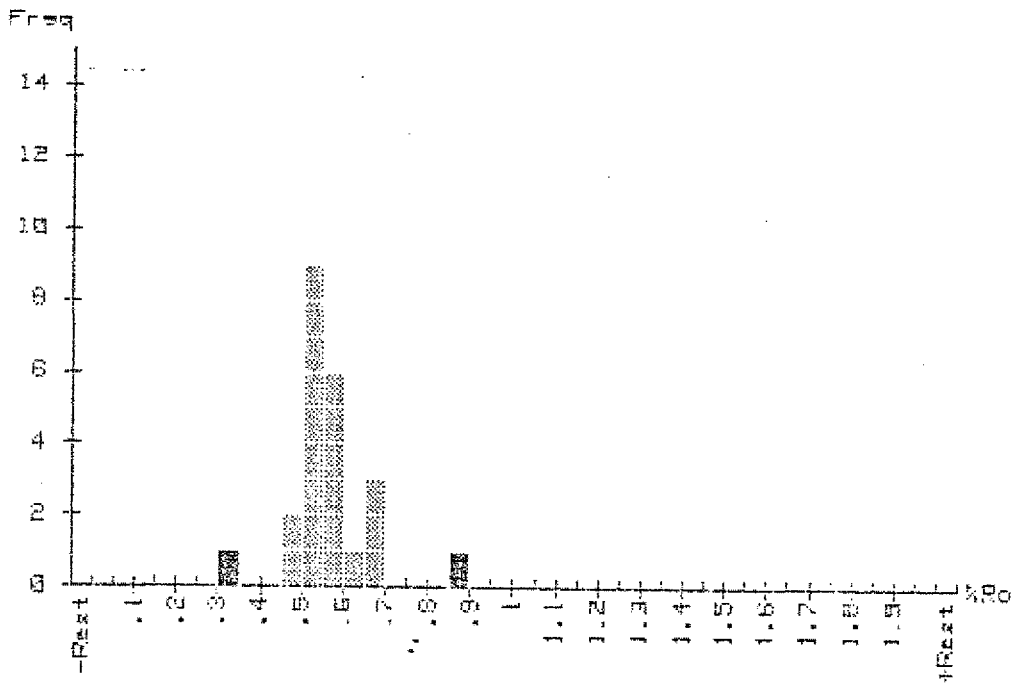


+ Pop. 1 From .50 to .70 Mean= .57 St.D= .05 Total= 24  
Pop. 2 From .80 to .85 Total= 0

The indigenous Population is marked '+',

	1	1	2	3	4	5	6	7	8	9	10
0	1	.504	.505	.506	.507	.521	.526	.527	.528	.537	.542
10	1	.552	.556	.558	.576	.578	.584	.585	.517	.621	.626
20	1	.537	.537	.647	.683	.648					

Sample No.: 1514 1 101  
 Well Name: 130/6-5  
 Depth: 1305:M  
 Analyst: JJ MC  
 Date: 125 11 86

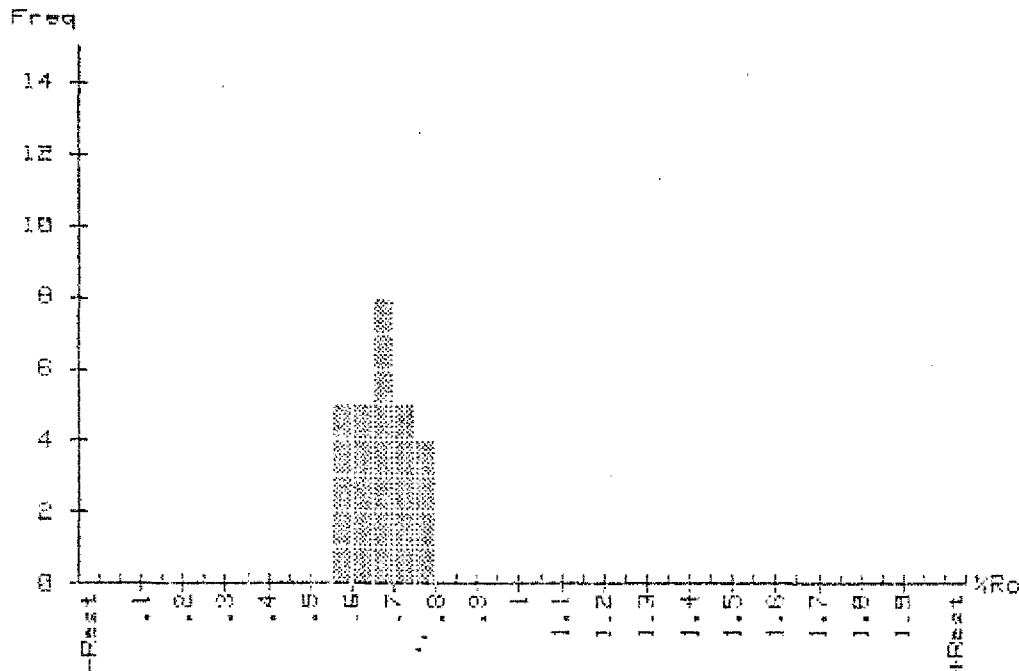


Pop. 1	From	.28	to	.35				Total=	1
* Pop. 2	From	.45	to	.70	Mean=	.58	St.D=	.06	Total= 21
Pop. 3	From	.85	to	.90				Total=	0

The indigenous Population is marked '\*'.

	1	2	3	4	5	6	7	8	9	10
0	.320	.451	.457	.506	.513	.513	.518	.525	.539	.543
10	.547	.550	.563	.567	.569	.587	.590	.599	.621	.653
20	.667	.683	.680							

Sample No.: 1515 1 101  
 Well Name: 130/6-5  
 Depth: 13139M  
 Analyst: IJ MC  
 Date: 125 11 86

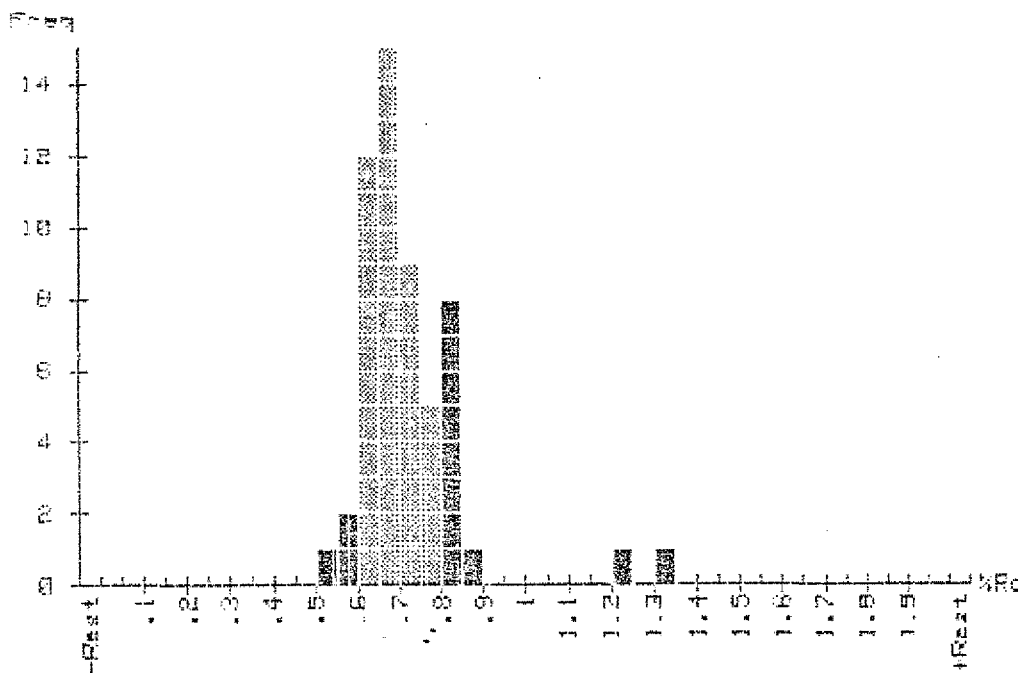


\* Pop. 1 From .55 to .90 Mean= .67 St.D= .07 Total= 27

The indigenous Population is marked '+'.  
 +

	1	2	3	4	5	6	7	8	9	10
0	.574	.588	.593	.594	.594	.608	.609	.616	.621	.644
10	.650	.653	.653	.684	.684	.686	.689	.693	.704	.706
20	.710	.721	.739	.772	.784	.795	.798			

Sample No.: 1616 1 101  
Well Name: 130/S-E  
Depth: 13241M  
Analyst: JJ MC  
Date: 125 11 86

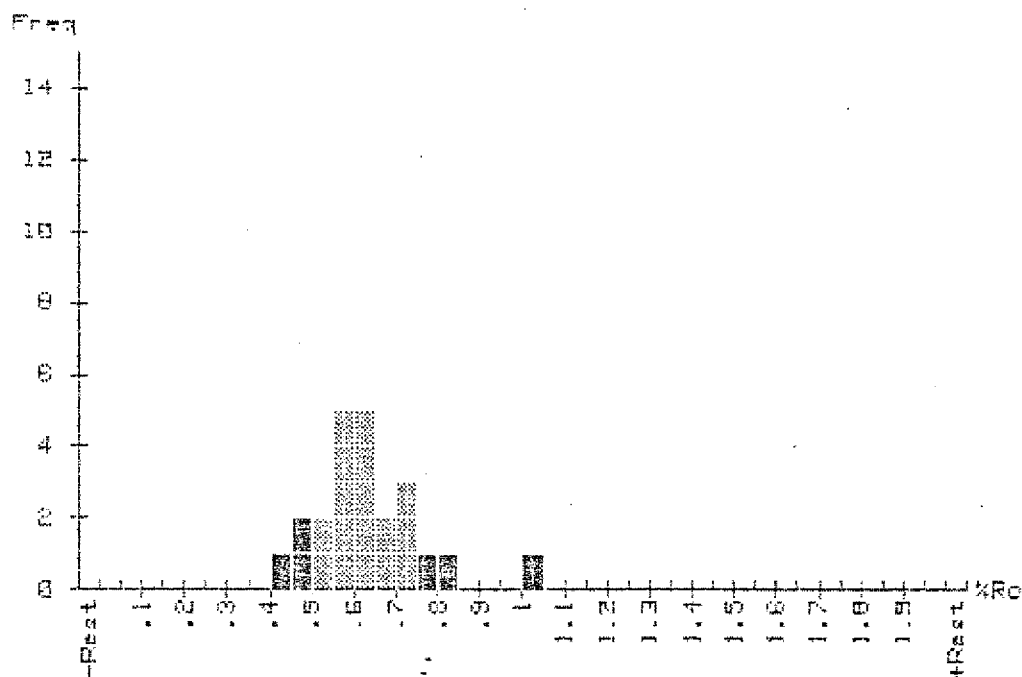


Pop. 1	From	.50	to	.60	Mean#	.55	St.D#	.03	Total#	3
* Pop. 2	From	.60	to	.80	Mean#	.69	St.D#	.05	Total#	11
Pop. 3	From	.80	to	1.35	Mean#	.91	St.D#	.18	Total#	11

The indigenous Population is marked '\*'.

	1	2	3	4	5	6	7	8	9	10	
0	!	.521	.574	.576	.616	.617	.619	.621	.627	.630	.633
10	!	.642	.643	.648	.649	.650	.651	.655	.659	.660	.669
20	!	.689	.671	.673	.673	.676	.677	.679	.688	.692	.697
30	!	.703	.704	.706	.719	.721	.725	.729	.733	.738	.773
40	!	.773	.790	.794	.799	.803	.807	.810	.825	.829	.830
50	!	.835	.837	.866	1.206	1.333					

Sample No.: 1517 1 (D)  
Well Name: 130/5-B  
Depth: 13225M  
Analyst: J MC  
Date: 125 11 86

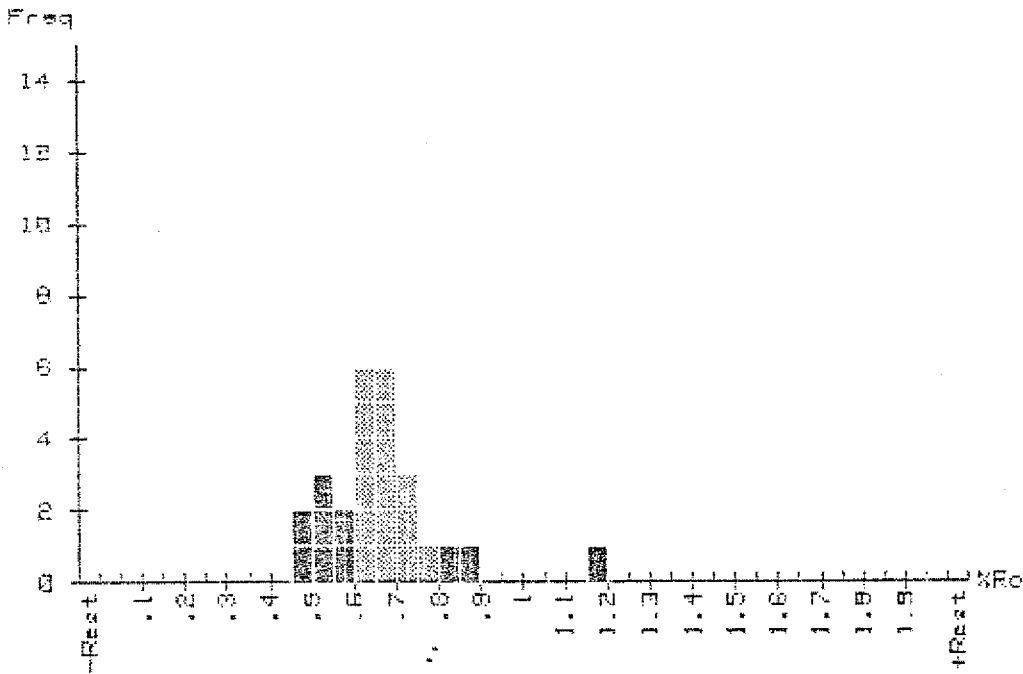


Pop. 1 From .40 to .50 Mean= .47 St.D= .03 Total= 3  
\* Pop. 2 From .50 to .75 Mean= .63 St.D= .07 Total= 17  
Pop. 3 From .75 to 1.05 Mean= .87 St.D= .14 Total= 3

The indigenous Population is marked '\*'.

	1	1	2	3	4	5	6	7	8	9	10
0	1	.431	.483	.486	.535	.543	.560	.568	.594	.596	.599
10	1	.605	.612	.616	.629	.642	.672	.685	.721	.731	.747
20	1	.780	.812	1.030							

Sample No.: 1518 (101)  
Well Name: 1307B-5  
Depth: 13397M  
Analyst: JJ MC  
Date: 125 11 98



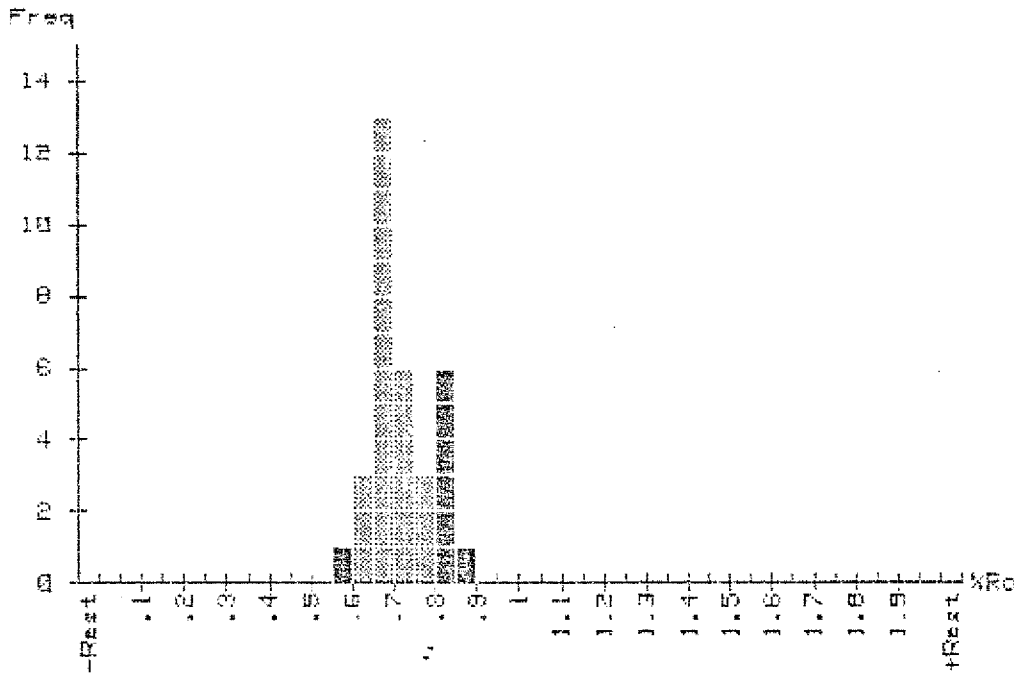
Pop.	From	To	Mean	St.D.	Total
1	.45	.60	.53	.05	7
* Pop. 2	.60	.80	.67	.05	15
Pop. 3	.80	1.22	.87	.19	3

The indigenous Population is marked '\*'.

	1	1	2	3	4	5	6	7	8	9	10
0	1	.457	.499	.507	.529	.548	.557	.595	.604	.616	.624
10	1	.624	.627	.631	.650	.659	.660	.688	.691	.693	.704
20	1	.716	.737	.774	.840	.896	1.195				



Sample No.: 1520 (101)  
Well Name: 130/8-5  
Depth: 13547M  
Analyst: IJ MC  
Date: 125 11 86



Pop. 1 From .55 to .60 Total= 1  
\* Pop. 2 From .60 to .80 Mean= .70 St.D= .05 Total= 25  
Pop. 3 From .80 to .90 Mean= .85 St.D= .02 Total= 7

The indigenous Population is marked '\*'.

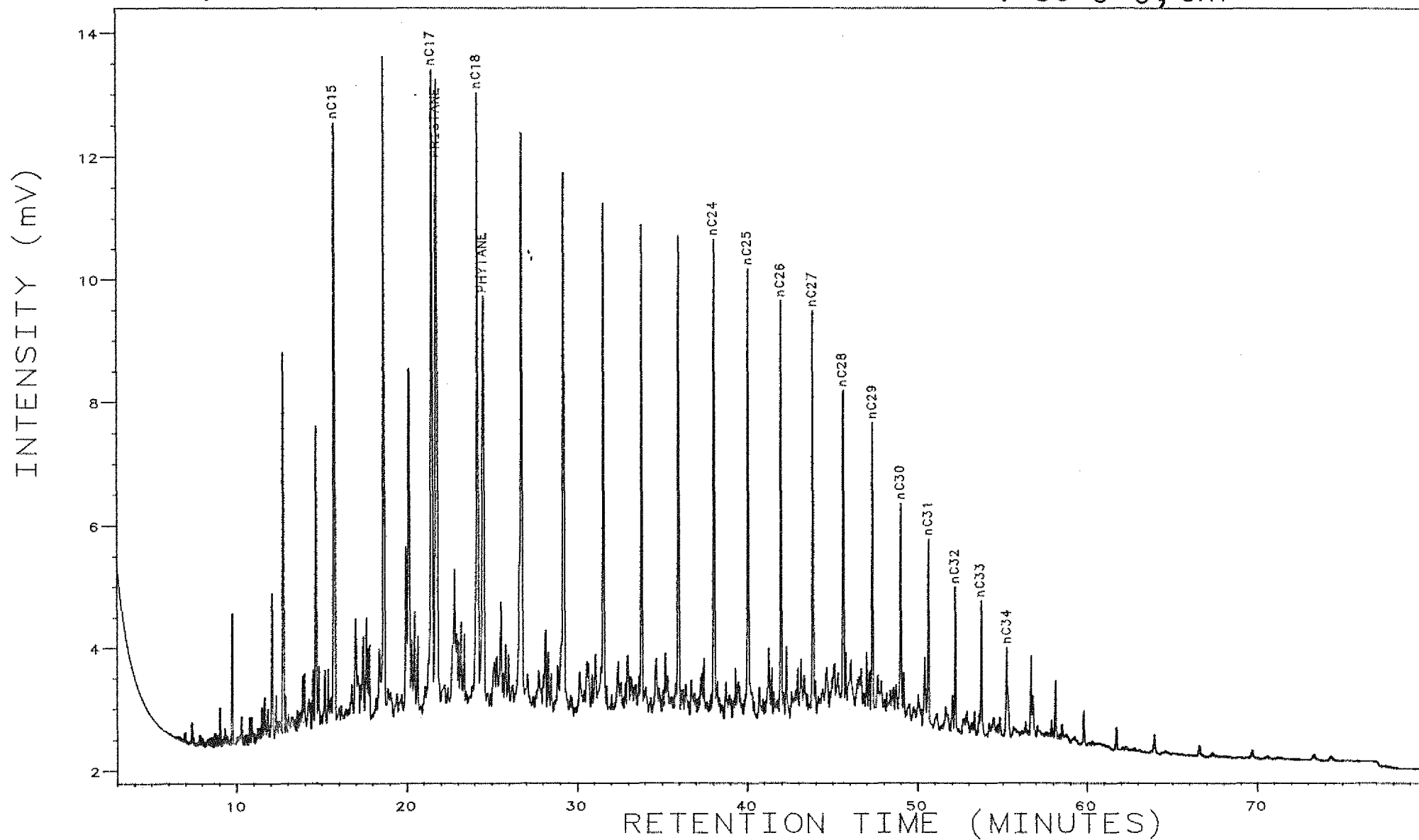
	1	2	3	4	5	6	7	8	9	10
0	.583	.607	.635	.644	.652	.664	.664	.672	.673	.675
10	.682	.687	.687	.688	.694	.696	.697	.721	.725	.731
20	.732	.737	.741	.772	.784	.795	.805	.815	.819	.819
30	.823	.828	.875							

Saturated fraction gas chromatograms

Analysis S15320509

4, 6, 1

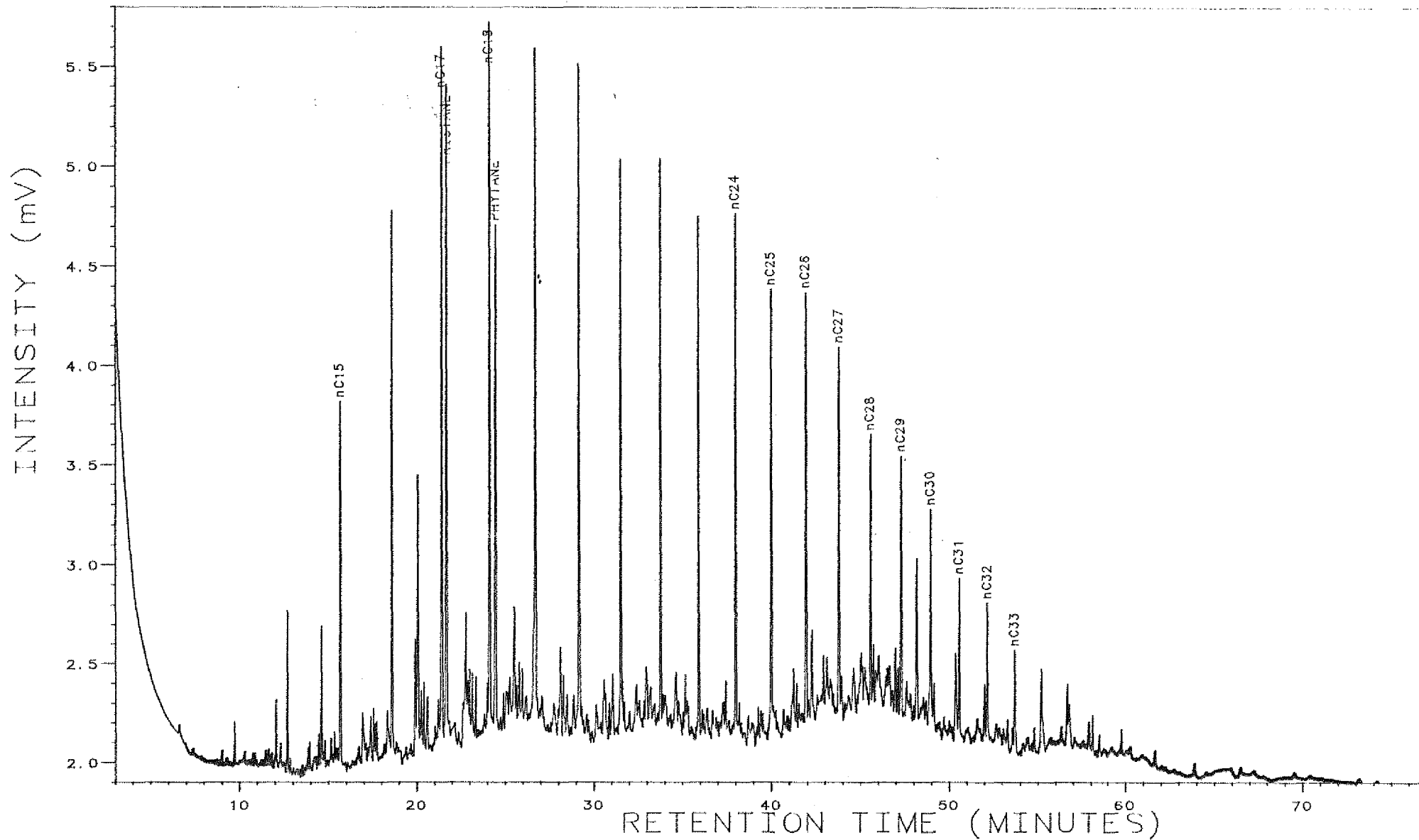
2458-70m, 30/6-5, SAT

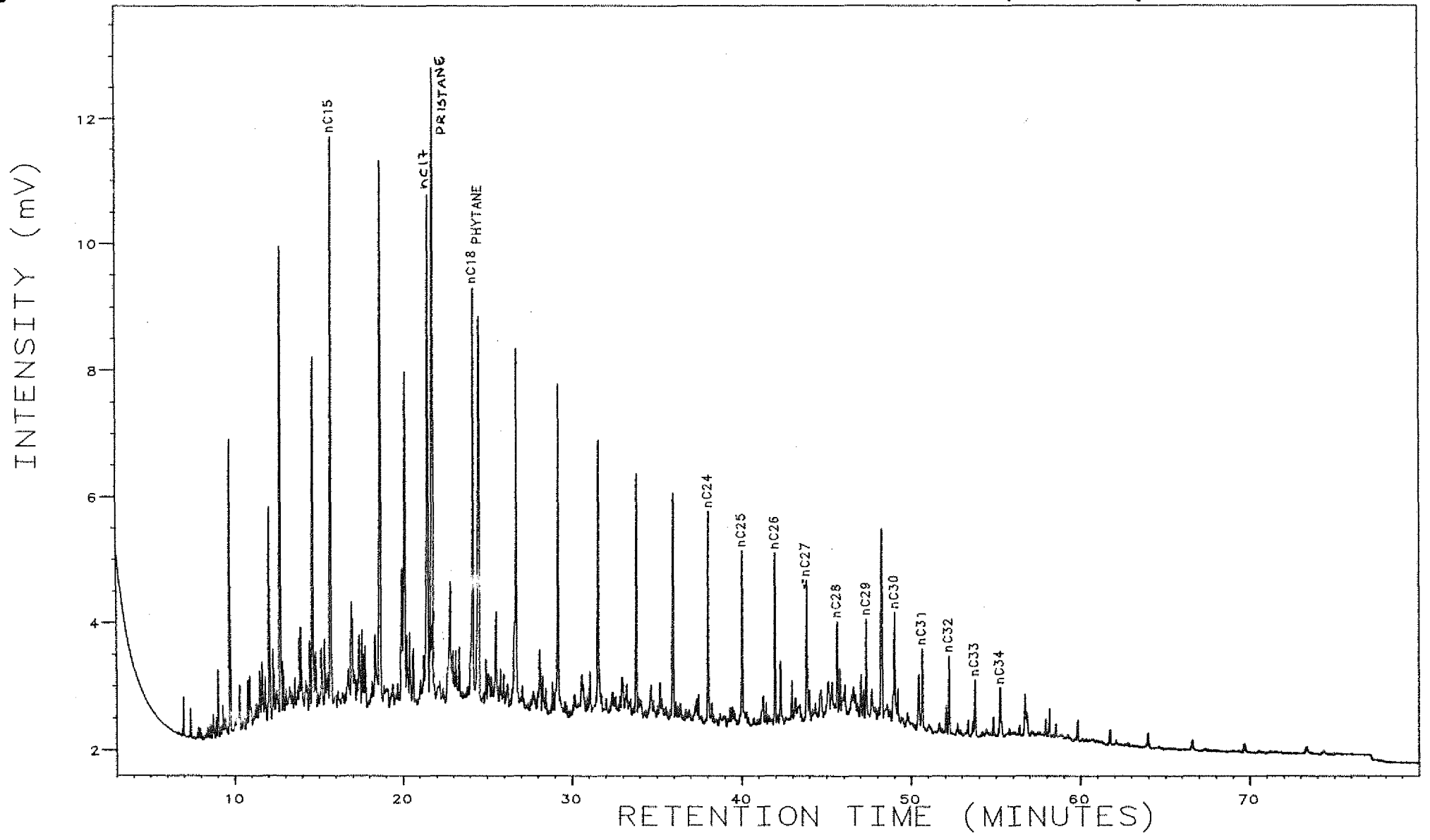


Analysis SA1532512

4, 1, 1

30/6-5, 2485-2512m, SAT

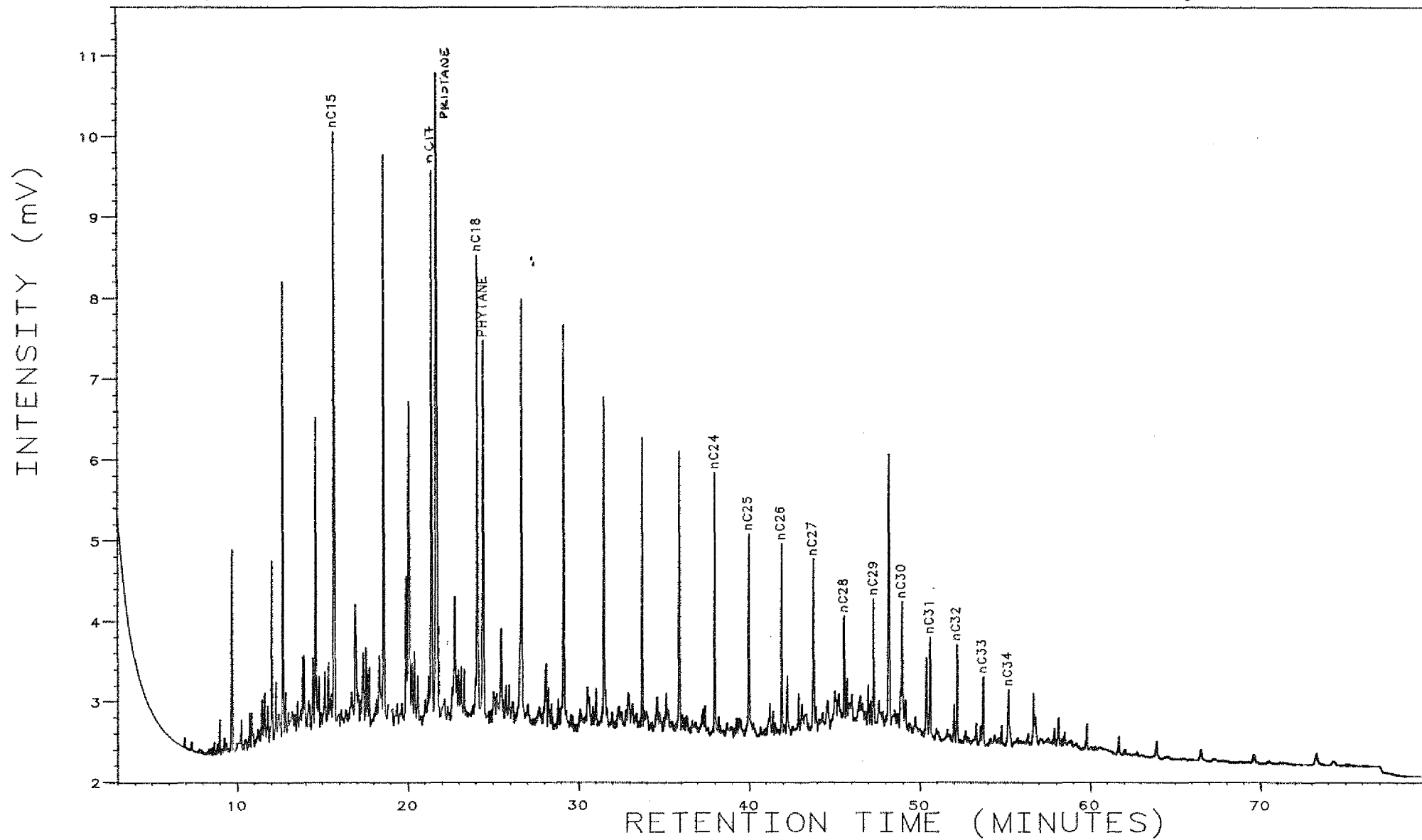




Analysis S15320509

4, 9, 1

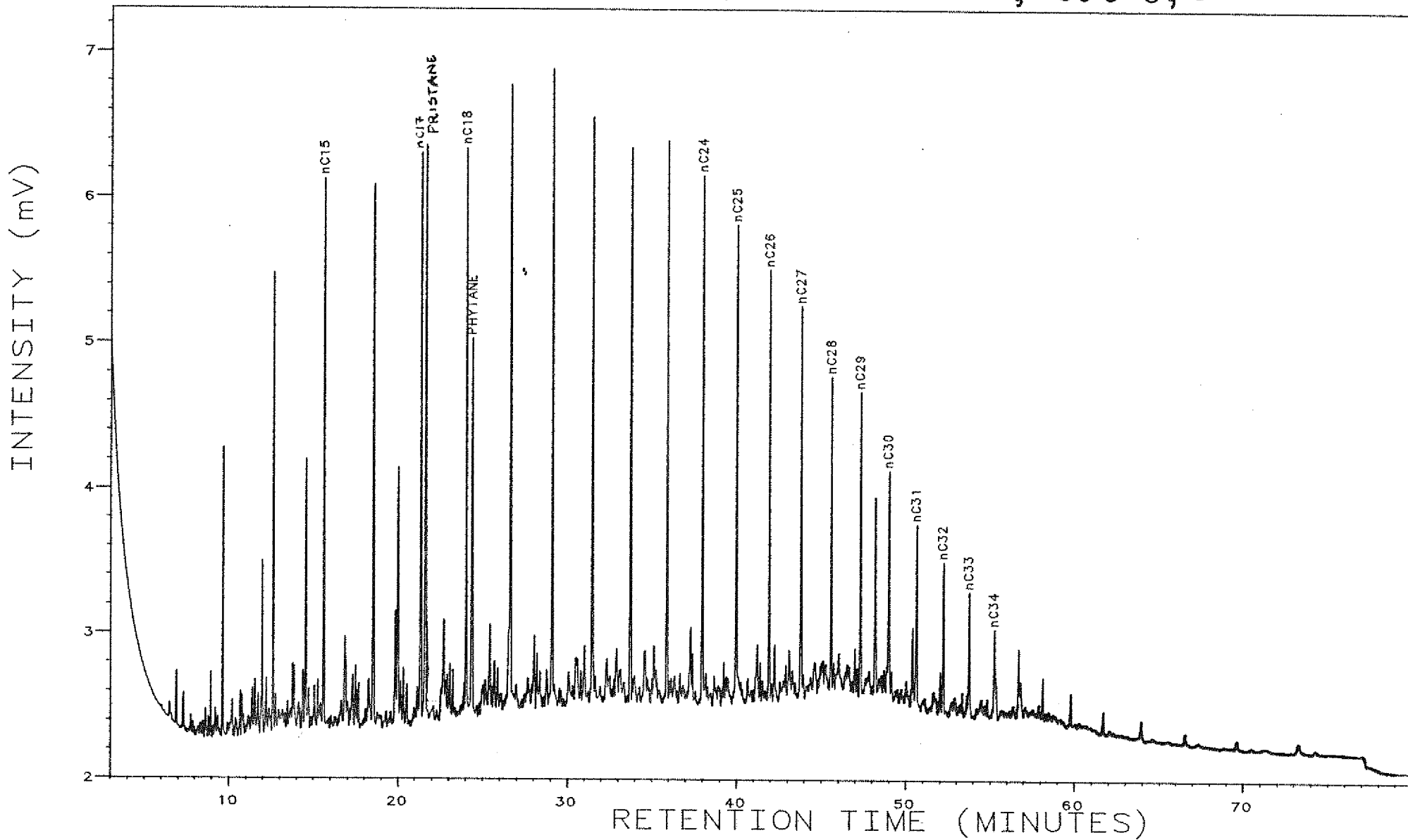
2545-47m, 30/6-5, SAT



Analysis S15320509

4, 11, 1

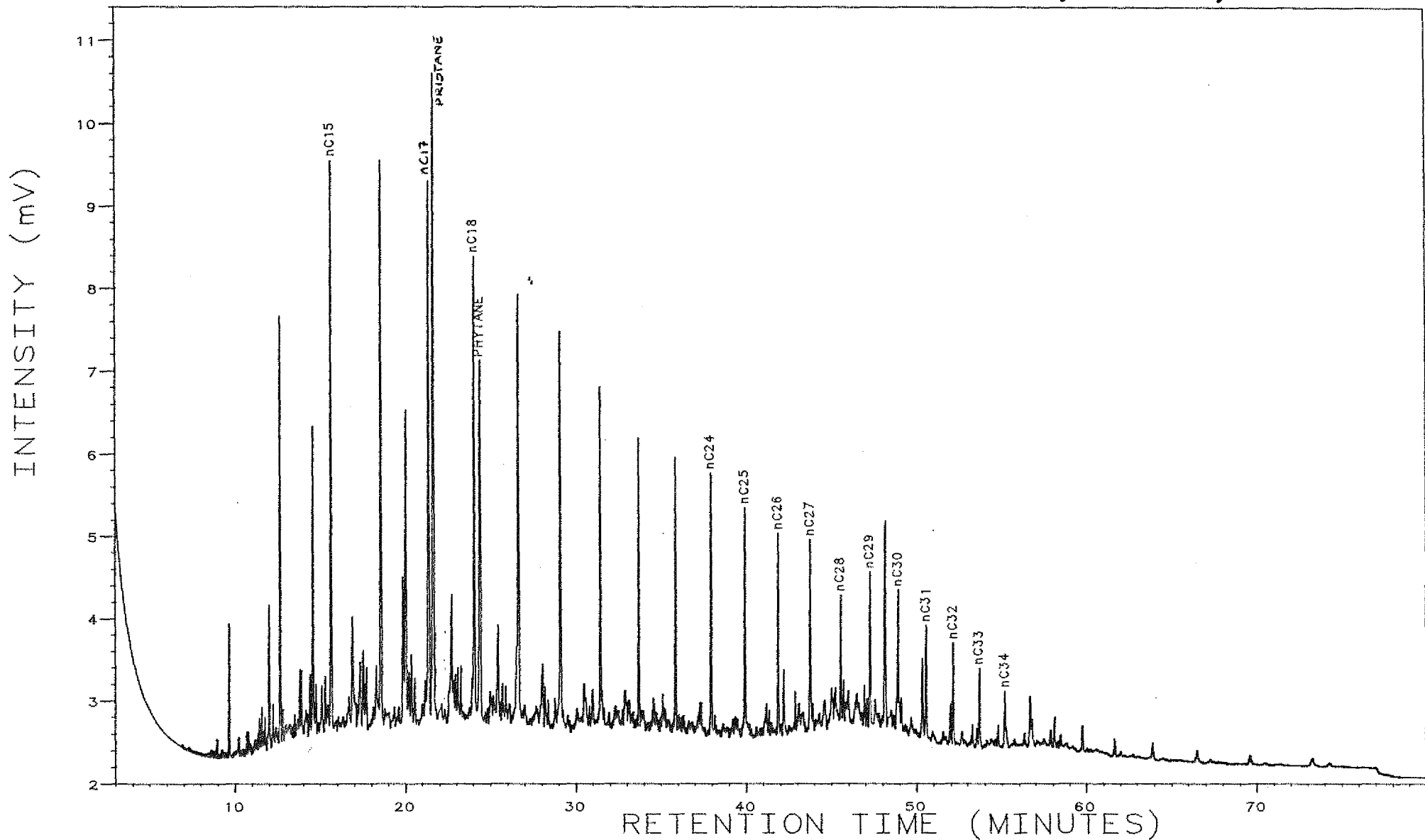
2563-81m, 30/6-5, SAT



Analysis S15320509

4, 10, 1

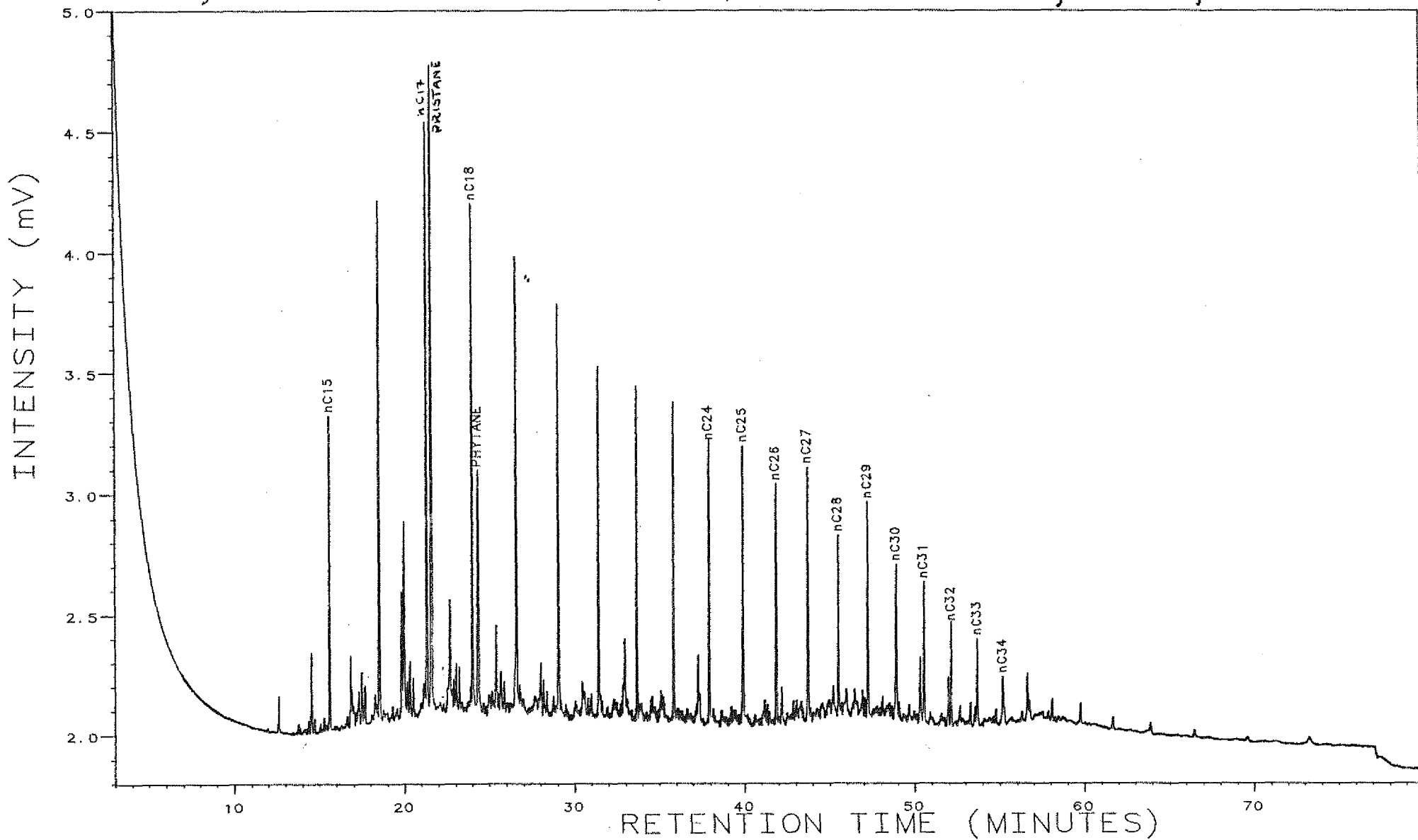
2599-2641 m, 30/6-5, SAT



Analysis S15320509

4, 12, 1

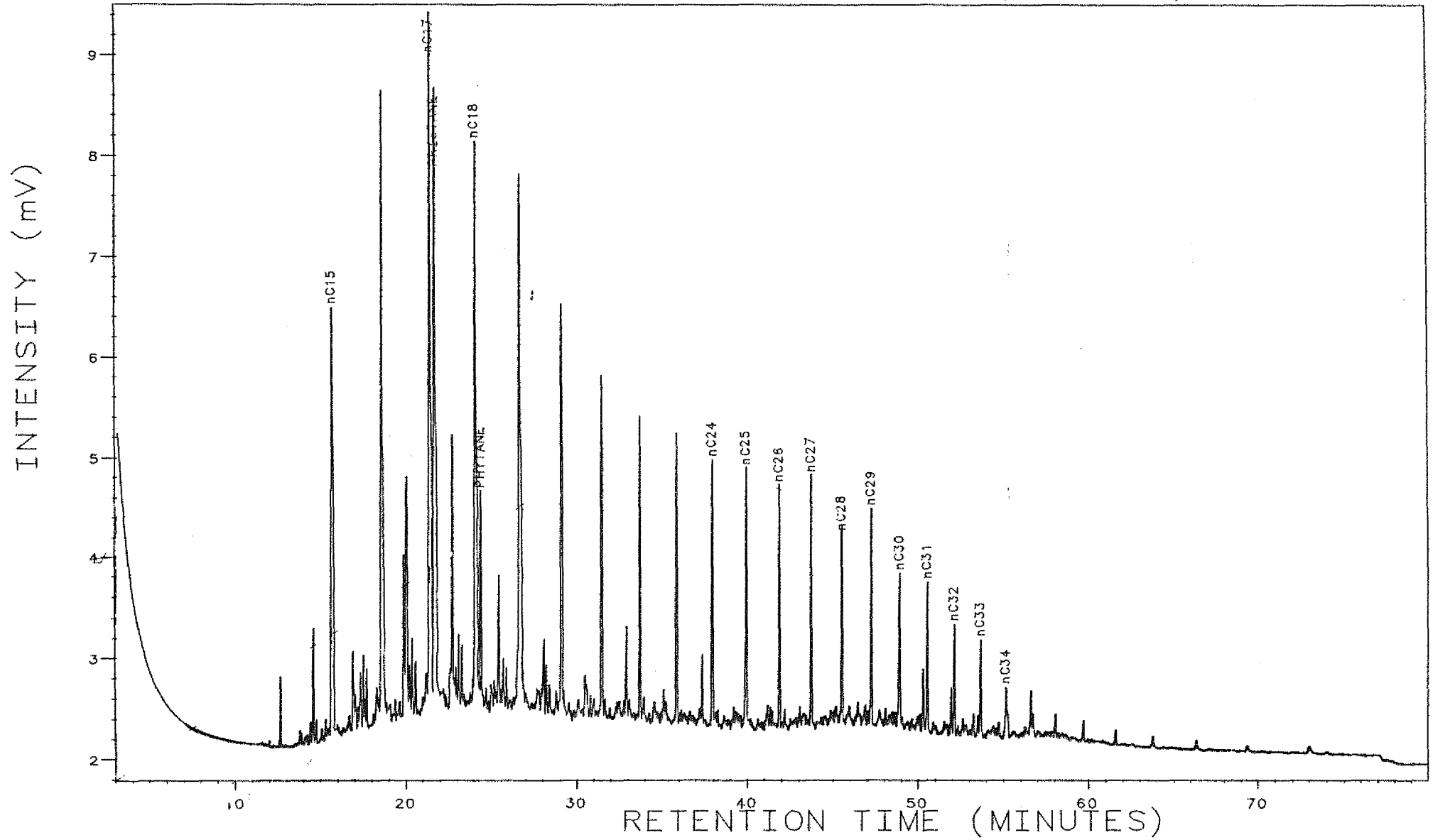
2665-2701 m, 30/6-5, SAT



Analysis S15320509

4, 1, 1

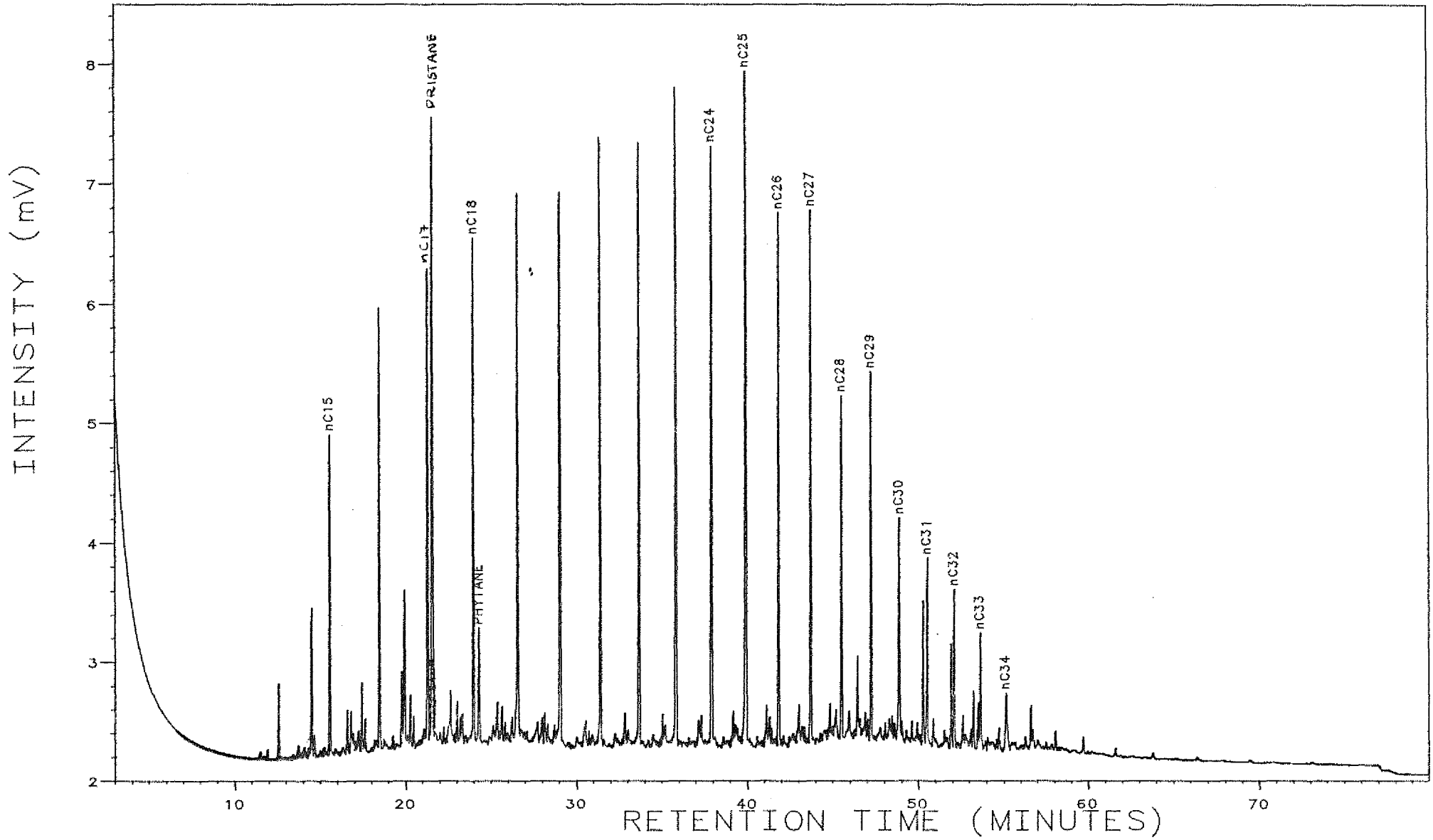
2713-85 m, 30/6-5, SAT



Analysis S15320509

4, 2, 1

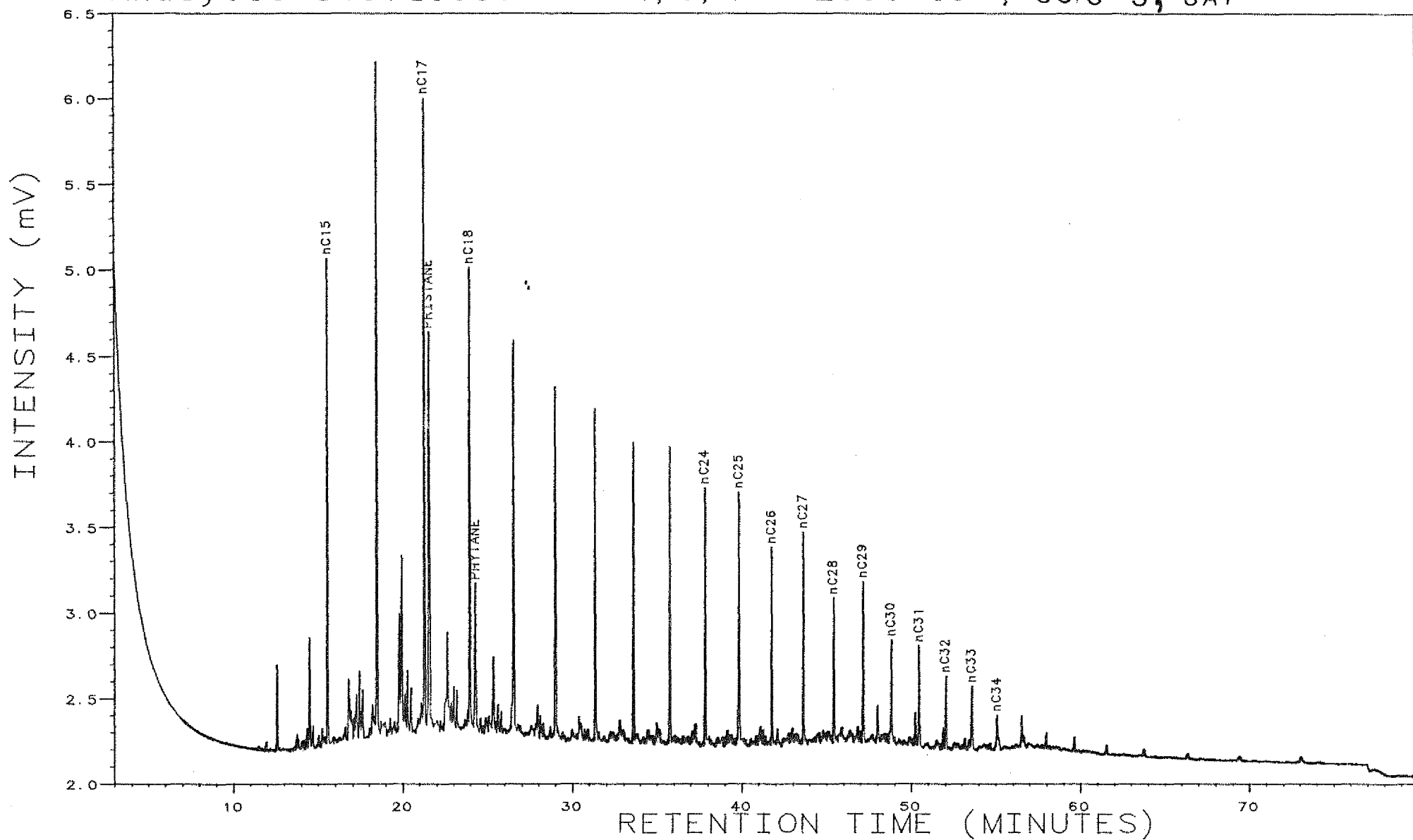
2857-66 m, 30/6-5, SAT



Analysis S15320509

4, 3, 1

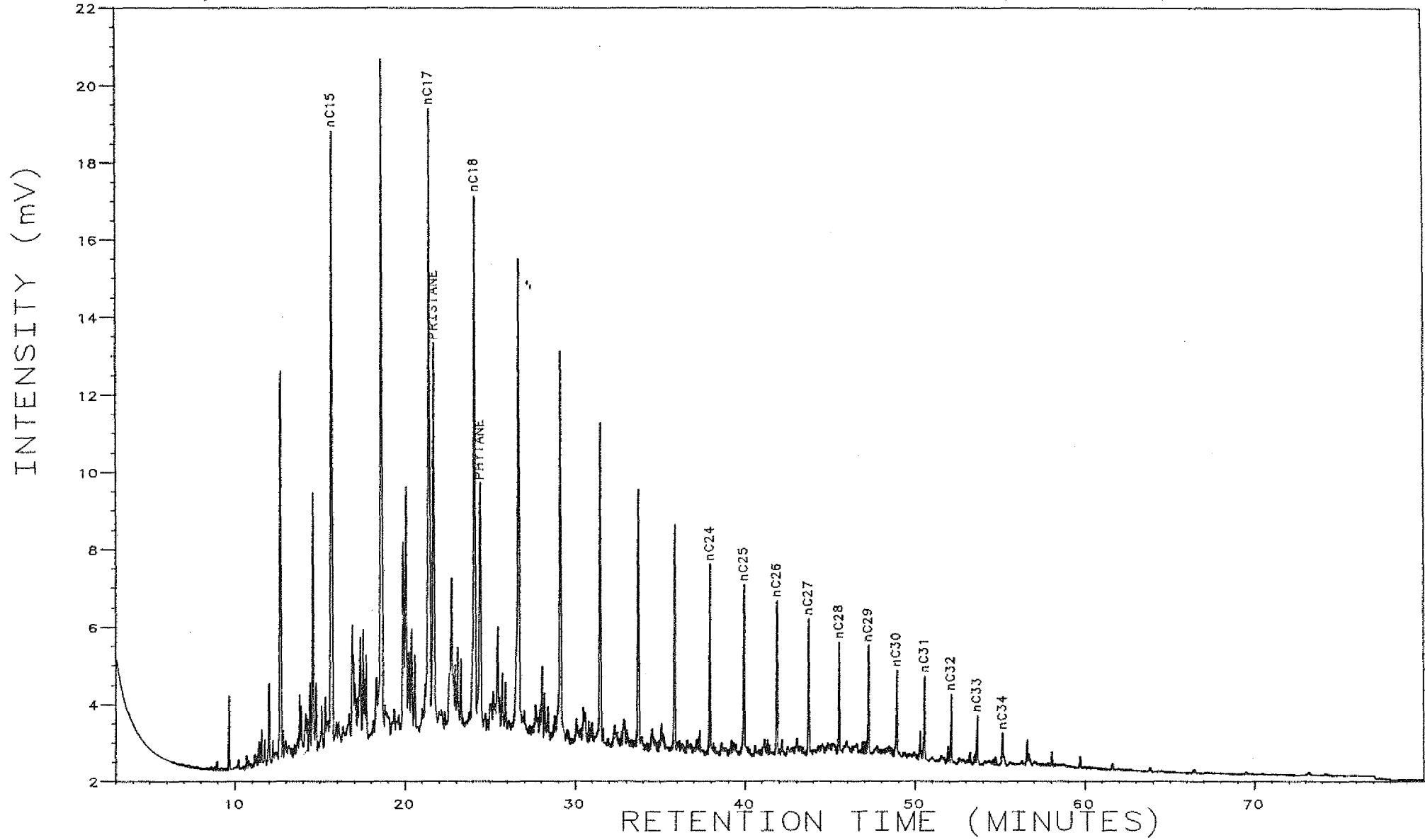
2965-86 m, 30/6-5, SAT



Analysis S15320509

4, 4, 1

3025 - 61m, 30/6-5, SAT



Analysis S15320509

4, 5, 1

3127-3205 m, 30/6-5, SAT

