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Håkon Magnussons gt. 1B — N-7000 Trondheim — Telephone (075) 15660 — Telex 55548

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Sourced Rock Analysis 7120/8-2

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P.B. Hall

AUTHORS/ FORFATTERE

P.B. Hall, N. Mills, P. Svensson, J. O. Vigran and A. Due

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SUMMARY/ SAMMENDRAG

The analysed section of well 7120/8-2 (720 - 2501m) was divided into 8 zones, based on lithology and light hydrocarbon data.

In zone D (1900 - 1980m) dark grey micaceous claystones with between 1.5 to 2.6% total organic carbon have mostly type IV kerogene, but some moderate mature type III kerogens from 1965 - 1980m have a fair potential as source rocks for gas.

The principal source rock section zone E (1980 to 2085 metres) consists of dark brownish-grey claystones, with 3-10% TOC which have moderate mature mixed type II/III kerogens. The claystones have a good to rich potential as a source for gas and some oil (condensates and paraffinic oil).

The carbonaceous claystones in zones G and H (particularly between 2336 and 2411 metres) are mature and have a good to rich potential as source rocks for gas.

KEY WORDS/ STIKKORD

Source Rocks Analysis | TOC/Rock-Eval | Sats, Aroms Py.GC | Microscope Analysis

CONTENTS

Processing of Samples and Evaluation of Visual Kerogen

Crushed rock samples were treated with hydrochloric and hydrofluoric acids to remove the minerals. A series of microscopic slides contain strew mounts of the residue:

T-slide represents the total acid insoluble residue.
N-slide represents a screened residue (15µ mesh).
O-slide contains palynodebris remaining after flotation ($ZnBr_2$) to remove heavy minerals.
X-slides contain oxidized residues, (oxidizing may be required to remove sapropel which embeds palynomorphs, or where high coalification prevents the identification of the various groups).

T and/or O slides are necessary to evaluate kerogen composition/-palynofacies which is closely related to sample lithology.

Screened or oxidized residues are normally required to concentrate the larger fragments, and to study palynomorphs (pollen, spores and dino-flagellates) and cuticles for paleodating and colour evaluation.

So far visual evaluation of kerogen has been undertaken from residues mounted in glycerine jelly, and studied by Leitz Dialux in normal light (halogene) using x10 and x63 objectives. By x63 magnification it is possible to distinguish single particles of diameters about 2µ and, if required, to make a more refined classification of the screened residues (particles >15µ).

The colour evaluation is based on colour tones of spores and pollen (preferably) with supporting evidence from colour tones of other types of kerogen (woody material, cuticles and sapropel). These colours are dependant upon the maturity, but are also influenced by the paleo-environment (lithology of the rock, oxidation and decay processes). The colours and the estimated colour index of an individual sample may therefore differ from those of the neighbouring samples. The techniques in visual kerogen studies are adopted from Staplin (1969) and Burgess (1974).

In interpretation of the maturity from the estimated colour indices we follow a general scheme that is calibrated against vitrinite reflectance values (R_o).

Ro	0.45	0.6	0.9	1.0	1.3
colour index	2-	2	2+	3-	3
Maturity intervals	Moderate mature	Mature (oil window)			Condensate window

The results are shown in table 8a and in enclosure 5.

Rock-Eval Pyrolysis

100 mg crushed sample was put into a platinum crucible whose bottom and cover are made of sintered steel and analysed on a Rock-Eval pyrolyser.

The results are shown in table 9 and enclosure 6.

Pyrolysis-Gas Chromatography (Py-GC)

25 mg of extracted kerogen concentrates were programmed pyrolysed (in helium) from 250°C - 500°C at a rate of 25°C/min. A furnace type pyrolyser directly connected to a splitter and fused silica capillary column was used. The pyrolysis product was trapped in a U-shaped part of the column which was cooled in a liquid N_2 nitrogen bath. At the end of the pyrolysis the pyrolysis product was injected by removing the nitrogen bath at a GC-oven temperature of 30°C.

GC chromatographic conditions:-

Column: 25m OV-101 fused silica capillary.
Carrier gas: Helium with inlet pressure 10psi.
Oven program: 30°-260°C at 4°C/min.
Split: 1:20

RESULTS AND DISCUSSION

Light Hydrocarbon Analysis and Lithological Description

Based on variations in the light hydrocarbon composition and in the lithology, the analysed sequence (705-2501 metres) was divided into eight (8) zones.

Zone A.	690-1245 metres
Zone B.	1245-1545 metres
Zone C.	1545-1900 metres
Zone D.	1905-1980 metres
Zone E.	1980-2085 metres
Zone F.	2085-2200 metres
Zone G.	2200-2351 metres
Zone H.	2351-2501 metres

Zone A. 690-1245 metres. Consists predominantly of grey to dark grey claystones, occasionally sandy and with some thin siltstones. The abundance of C_1-C_4 hydrocarbons is high (i.e. rich) in this zone relative to the one directly underneath. Wetness is relatively low and iC_4/nC_4 rate fairly high. The abundant C_1-C_4 hydrocarbons might indicate introduction of dry gas or diagenetic gas, particularly into the sandy claystones between 930-945 metres.

Zone B. 1245-1545 metres. Consists mostly of dark claystones. The abundance of C_1-C_4 hydrocarbons is much less than in zone A. Percentage wetness increases from 10-40% to 40-80%.

Zone C and D. 1545-1980 metres. Consists of dark grey claystones with minor marly limestones and sandstones between 1710-1785 metres. In zone D red-brown claystones and grey limestones are interbedded with dark grey claystone from 1905-1980m. C_1-C_4 gas abundances are again high (i.e. rich) as in zone A, wetness is lower than in zone B, but increases downhole. At 1965 metres in zone D the iC_4/nC_4 values show a sudden decrease. The highest C_1-C_4 values found in the marly limestone/sandstone section 1650-1725 metres are probably due to migrated hydrocarbons.

Zone E. 1980-2025 metres. Consists wholly of dark brownish-grey claystones. C_1-C_4 and C_5+ values are very high in this zone although the hydrocarbons are probably indigenous to the lithology rather than migrated hydrocarbons. The percentage wetness is particularly high between 1995-2025 metres and iC_4/nC_4 ratio is at a minimum in this zone.

Zone F. 2085-2200 metres. Material from 2085 to 2173 metres poor sample quality - probably sandstones dominate in this section. The only noticeable changes from zone E in the C_1-C_5+ hydrocarbons is a decrease in C_1-C_4 abundance and a slight increase in iC_4/nC_4 ratios.

Zone G. 2200-2351 metres. The top of this zone is marked by dark grey claystones with some carbonaceous claystone and coal, the rest of the zone is mainly of sandstones with perhaps a few, thin dark grey claystones. This zone shows a generally similar trend to zone F in abundance, wetness and iC_4/nC_4 ratios, with perhaps a decrease in C_2-C_4 gas abundance going down the section. There is a large increase in C_2 - C_4 and C_1 - C_4 gas abundances in the lowest sample from this section, which consists of 50% coal and carbonaceous claystone.

Zone H. 2351-TD. Consist predominantly of sandstones with some carbonaceous claystones and coals. Generally richer in methane than zone G, the most marked difference in the light hydrocarbons is the increase in iC_4/nC_4 ratio from 0.3-0.46 to 0.48-0.78.

Total Organic Carbon (TOC)

Generally the claystones or siltstones which constituted more than 10% of a sample were picked and analysed. Occasionally claystones with different colours were picked and analysed separately. Limestones were picked and analysed in a few cases.

Zone A. 690-1245 metres. Consist predominantly of grey to dark grey claystones with 0.6% to 1.2% TOC. One siltstone from 930-945 metres has a TOC value of 0.32%.

Zone B. 1245-1545 metres. Again consist mostly of grey to dark grey claystones with TOC values from 0.9 to 1.1% TOC.

Zone C and D. 1545-1980 metres. This zone includes dark grey claystones interbedded with marly limestone(s) and sandstones between 1710-1785 metres and with red brown claystones and grey limestone between 1905-1980 metres. The dark grey claystones can be divided into two on the basis of TOC values. From 1545 to 1605 metres the TOC values are similar to those in zone B, whereas below that, TOC values are slightly higher varying from 1.5 to 2.3%. The marly limestone has a TOC of 0.9% and the grey limestones and the red brown claystones generally less than 0.4%.

Zone E. 1980-2085 metres. Consists wholly of organic carbon-rich, dark grey and dark brownish grey claystones with TOC values from 3.4 to 10.4%.

Zone F. 2085-2200 metres. Poor quality samples in this zone. The majority of claystones in this zone might be caved material. Generally sandstones dominate. Grey claystones have from 2.7 to 3.4% TOC.

Zone F. 2201-2351 metres. The top part of this zone 2201-2246 metres comprises some grey to dark grey claystones with 2.4-4.4% TOC. Kaolinitic claystone from 2201-2216 metres has a TOC value of 0.74%. The rest of the zone, except from 2336-2351 metres, is dominated by sandstones. These sandstones are marked by fluorescence in ultraviolet light and have a weak to strong crush cut (residual oil?) particularly between 2216-2276 metres. From 2336-2351 metres there is coal and some carbonaceous claystone, one TOC value of 62% was evidently measured on coal.

Zone H. 2351-TD. Predominantly sandstones, with some coal particularly between 2396-2411 metres, and thin, dark grey to black carbonaceous claystones with 4.7% to 9.2% TOC. Grey claystone from 2486-2501 metres has a TOC of 2.05% which is probably too high and may have coaly laminae, or be contaminated with material from higher in the well.

Extraction and Chromatographic Separation

Fifteen samples were extracted. The extractable organic matter (EOM) was separated into saturated and aromatic hydrocarbons and NSO fractions. Gas chromatograms of the saturated and aromatic hydrocarbon fractions were obtained.

Extraction Data and Saturated Hydrocarbon Analysis

Zones A, B and C (690-1905 metres). Four samples were extracted from this part of the sequence. M-6909, M-6949, M-6961 and M-6973 (870-885m, 1470-1485m, 1650-1665m, 1830-1845m). Except for the first sample which is of grey/green-grey claystones, the samples are grey-dark grey claystones becoming richer in TOC (1 to 2% TOC) down the sequence. The extraction data indicate the presence of migrated or contaminant hydrocarbons. The top and bottom sample are particularly rich in hydrocarbons (88% and 64% respectively) in what is a sequence which is at most, moderate mature. The abundance of extractable hydrocarbons and extractabilities (EOM in mg per gram of organic carbon) is only fair to good for these samples. The saturated hydrocarbon gas chromatograms support the suggestion of introduced hydrocarbons. Three of the samples (not M-6961) show a front-end biased n-alkane distribution ranging from nC_{12}-nC_{30} with a CPI close to 1, and a maximum at nC_{14} or nC_{15}. Pristane/nC_{17} values are much less than 1. In M-6961, the n-alkanes above nC_{20} are more prominent and there is a slight odd n-alkane predominance from nC_{21} to nC_{29} (nC_{26} is high, but there is more than one compound contributing to this peak) the pristane/phytane ratio is high in this sample (5.6) indicating a mainly terrestrial source. It should be emphasised that the Rock-Eval production indices are high, particularly for the first three samples (>0.3) which is additional evidence for the presence of migrated hydrocarbons.

Zone D. (1905-1980 metres). Two samples M-6979 and M-6981 (1920-1935m, 1950-1965m) were extracted. These samples consist of dark grey claystones with 2-3% of organic carbon. M-6979 has very similar characteristics (both in gc trace and extraction data) to M-6973 but with slightly higher abundance of hydrocarbons. M-6981 shows a lower saturate/-aromatic hydrocarbon ratio to any of the samples above. The saturated

hydrocarbon gas chromatogram of this sample and the low saturate/-aromatic ratio are similar to the analysed samples in zone E and they have therefore been included in the discussion on that group of samples.

Zone E. 1980-2085 metres. Three samples of the dominant lithology, dark brownish-grey claystones, were extracted from this zone M-6984, M-6987 and M-6989 (1995-2010m, 2040-2055m, 2070-2085m). Included in this group is one sample from zone D, M-6981, which has both characteristics of samples in zone E and those of zones above. All these samples have rich abundances of extractable hydrocarbons and generally rich for extractabilities (the lowest sample which is richest in TOC has only fair-good extractability). They contain slightly more aromatic hydrocarbons than saturates, unlike samples in the zones above; with approximately 50% hydrocarbons in the first three and only 30% hydrocarbons in the bottom sample. The saturated hydrocarbon gas chromatograms indicate that there is an abundance of low molecular weight hydrocarbons (below nC_{20}) in a zone which is moderate-early mature. The n-alkane distributions, which range from nC_{10}-nC_{40}, are front-end biased (particularly the three samples within zone E), although there is a prominent shoulder of n-alkanes above nC_{20}. The maximum n-alkane is nC_{15} for the top two samples, nC_{13} in the next sample, and nC_{11} in the bottom sample. There appears therefore, to be a slight increase in low molecular weight hydrocarbons (below nC_{15}) going down this sequence of TOC-rich claystones. Pristane is the dominant alkane with pristane/nC_{17} values less than 0.6. There is a slight odd predominance particularly noticeable in the sample highest in the sequence. The fairly high pristane/phytane values (>2) and the abundance of high molecular weight n-alkanes (i.e. above nC_{20}) suggests a large terrestrial contribution to the kerogens of these samples. Superimposed on the n-alkane envelope mainly above nC_{20} are low molecular weight n-alkanes which are probably in part migrated hydrocarbons.

Zone F. (2085-2200 metres). One sample was extracted from this zone which, although it contains a mixture of dark claystones, is probably a sandstone-dominated sequence. The several types of dark claystone, are probably caved and are mixed in with abundant mud additives. However, dark claystones from the base of this zone were considered to

be, at least in part, indigenous. The sample extracted has a rich abundance of extractable hydrocarbons and extractability. Percentage of total hydrocarbons is fairly high (51%) and, as in Zone E, aromatics dominate. The saturated hydrocarbon gas chromatogram shows a unimodal front-end biased n-alkane distribution ranging from nC_{11}-nC_{33} with only slight odd predominance. Pristane/nC_{17} ratio is low (less than 1) and pristane/phytane greater than 2. The n-alkanes above nC_{20} are a relatively minor component. This distribution is probably produced by hydrocarbons introduced into the claystone. The abundance of free hydrocarbons in the associated sandstones suggests that the material may have migrated into the claystones from the sandstones.

Zone G. (2200-2351 metres). Three samples were extracted from this zone M-6996, M-7001 and M-7003 (2231-2246m, 2306-2321m, 2336-2351m). They have rich abundances of extractable hydrocarbons and rich extractabilities (particularly M-6996). The percentages of saturated hydrocarbons in both samples is lower than in most samples from higher zones. M-6996 resembles the sample from the zone above in the saturated hydrocarbon gas chromatograms, suggesting that the claystone analysed contains migrated hydrocarbons. The other analysed sample, a partly waxy, dark grey claystone is different. The n-alkane distribution is front-end biased with a maximum at nC_{16}, but there is a prominent shoulder of high molecular weight n-alkanes (above nC_{20}) with a distinct odd n-alkane predominance. The pristane/phytane ratio is greater than three and pristane/nC_{17} ratio is greater than one. These characteristics indicate that there is a prominent terrestrial component in the kerogen of this sample.

Zone H. (2351metres-TD). One sample M-7005 (2366-2381m) was extracted from this zone, dark grey, black and grey claystones. This sample is similar to M-7001 from zone G. In abundance of extractable hydrocarbons, but has a lower extractability. The saturated hydrocarbon gas chromatogram is also similar although the higher molecular weight n-alkanes are slightly more prominent. The maximum occurs at nC_{15}, and pristane is the dominant n-alkane, and pristane/phytane ratio is greater than three. The saturated hydrocarbon pattern indicates a major terrestrial component in the kerogen of this sample as with M-2001. The abundance of n-alkanes below nC_{20} is probably in part from migrated hydrocarbons.

Aromatic Hydrocarbons

Zones A, B, C and D (690-1985 metres). Aromatic hydrocarbon gas chromatograms of five samples from these four zones were obtained. Except for the sample highest in the sequence M-6909 (870-885m), the remainder are very similar. The alkyl naphthalenes; C_1 (A group of peaks), C_2 (B group of peaks) and C_3+ (C group of peaks), are prominent in all samples, but one peak in group C is dominant. In addition, two peaks marked Q_1 are particularly prominent in these samples. There is also a distinct unresolved hump in region F which may include aromatised steranes and triterpanes. the sample highest in the sequence M-6909 is dominated by a peak in group B and the two peaks in Q_1 are a relatively minor component.

Zone E. (1980-2085 metres). Four samples were examined from this zone. They have quite different aromatic hydrocarbon distributions than the zones above. Naphthalene (N), C_1 and C_2 napthalenes (groups of peaks, A and B) dominate, particularly C_1 naphthalenes. Although only tentatively identified C_1 dibenzothiophenes appear to be present (they have retention times slightly shorter than the C_1 phenanthrenes (i.e. D group of peaks). The general distribution of aromatic hydrocarbons suggest a derivation from type III kerogens.

Zones F and G and H (2085m-TD). Four samples were examined from these zones. The top two resemble samples from Zone E in their aromatic hydrocarbon distributions. There are slight differences in the C_3 naphthalenes (group C). Compounds with a shorter retention time dominate in these two samples compared with those from higher zones. The other two samples show slight changes to the top two. C_2-naphthalenes (B group of peaks) are more prominent and the C_1-dibenzothiophenes are less prominent, also the C_3-naphthalenes show a slightly different pattern.

The samples from below 1980 metres especially are probably affected by migrated hydrocarbons, so the abundant naphthalene and C_1 and C_2 (alkyl) naphthalenes may in part represent introduced hydrocarbons, i.e. not derived from the indigenous kerogens.

Investigations in Transmitted Light

The sedimentary organic matter of 7120/8-2, interval 885m to 2381m, was investigated on the basis of 15 selected samples of picked ditch cuttings. On the basis of pollen and spore colours the entire interval has been evaluated as immature to moderately mature.

The acid insoluble residues of the analysed sequence are subdivided into shorter intervals. The intervals are based on the relative composition and the preservation of the material. To some extent we have also used stratigraphic occurrences of the palynomorphs observed. We have not performed any detailed palynological analyses, nor have we had access to stratigraphic tops.

885m to 1845m:

Apart form the uppermost sample, the residues of this interval were fairly small. They were rich in woody and reworked woody material. True sapropel was subordinate. The palynomorphs were mainly well preserved dinoflagellate cysts.
Colour index: 1+/2-.

1935m to 1965m:

Two poorly preserved samples, where aggregates were mainly composed of woody and reworked woody material in an amorphous matrix. Jurassic/Cretaceous, darkly stained cysts were observed but the embedding matrix obscures them. Some cuticles may be present, but if so they are strongly degraded.
Colour index: 1+/2-, 2-/2.

2010m, 2055m, 2085m and ?2201m:

Strongly pyritic samples dominated by poorly preserved cuticles which are less degraded than in the interval above. Woody material and ?true sapropel are subordinate. Early Jurassic pollen was identified . Sample from 2201m may represent a mixture of more than one lithology. One is Cretaceous, judged by the cysts present.
Colour index: 1+/2-, 2-/2.

2246m: (and possibly 2201m):
A residue dominated by degraded woody material in aggregates with an amorphous matrix. Cuticles seem subordinate. Botryococcus is present. The palynomorphs are of different and better preservation than recorded above.
Colour index: 2-/2, 1+/2-.

2321m:
Dense pyritic aggregates of dominantly degraded cuticular substance together with some woody material. Palynomorphs are fairly well preserved.
Colour index: 2-/2, 1+/2-.

2381m:
This residue seems to represent a mixture of lithologies of different age including Late Cretaceous. The results should be discharged since detailed palynological analysis is needed to separate assemblages of nearly the same stage of maturity.
Colour index: 1+, 2-/2.

Examination in Reflected Light

Twenty one samples were taken from a depth range of 1500metres. The samples consisted of claystone or shale with minor limestone or sandstone. The top 800m of the sequence yielded very poor quantities of vitrinite and only below 1935m were good populations encountered. The coals have a higher reflectance than the sediments and this is probably because they are less affected by bitumen and/or iron staining.

Sample M-6909, 870 - 885m: Claystone, RO = 0.39 (1)
The sample contains small, moderately abundant bitumen wisps and very small, rounded inertinite fragments. There is no obviously reworked vitrinite and only one particle of possibly primary vitrinite. Yellow/-orange fluorescence is observed from spores but these occur in trace amounts only.

Sample M-6917, 990 - 1005m: Claystone, Ro = 0.43 (4)
This is a bad sample. It has a low organic content consisting of very small, rounded, inertinite particles. There are only four vitrinite particles which have a poor statistical distribution of reflectance values. There is deep brown bitumen staining. U.V. light shows green fluorescence from carbonate minerals (picking out fossils) and a trace of green/-yellow spores.

Sample M-6929, 1170 - 1185m: Claystone and limestone, Ro = 0.44 (1)
The sample has a low organic content dominated by inertinite fragments. There are occasionally traces of liptinite minerals but only one piece of vitrinite. U.V. light shows green/yellow and yellow spores in low quantities.

Sample M-6937, 1290 - 1305m: Claystone, Ro = 0.44 (9)
The sample has a low to moderate organic content with a high proportion of inertinite. There is a moderate content of degraded organic structures (spores?) but very few vitrinite particles. There is yellow and yellow/orange spores.

Sample M-6945, 1410 - 1425m: Claystone, Ro = 0.44 (3)
The sample has a moderate organic content and is very rich in inertinite which occurs as very small, rounded fragments.

There is heavy bitumen staining in places but there is a very low content of vitrinite. There is yellow and yellow/orange fluorescence from spores which are present in low quantities.

Sample M-6953, 1530 - 1545m: Claystone with carbonate, Ro = 0.50 (1)'
The sample is very dominated by inertinite and reworked vitrinite. There is a trace of bitumen and organic relics of spores. There is only one possible primary vitrinite particle. U.V. light shows yellow/orange and light orange fluorescence from spores and green fluorescence from dinoflagellates (?).

Sample M-6961, 1650 - 1665m: Claystone, Ro = 0.47 (10)
The sample contains dominantly inertinite and/or reworked fragments with a few good vitrinite particles and the occasionally concentration of bitumen wisps. Some structural outlines are visible (organic wall remains?). There is light orange fluorescence from a trace amount of spores.

Sample M-6965, 1710 - 1725m: Claystone and sandstone, Ro = 0.48 (14)
The claystone is rich in organic material but the sandstone is virtually barren. Inertinite is dominant but there is a fair amount of bitumen and vitrinite. There is some pyrite breakdown which could mean that the bitumen is overestimated and that the sample is slightly oxidised. There is a low content of light orange fluorescing spores.

Sample M-6973, 1830 - 1845m: Claystone and limestone, Ro = 0.51 (11)
The sample has a moderate organic content dominated by inertinite. There is some bitumen staining but because of the abundance of limonite and rust this is difficult to assess. There are a couple of good stringers of vitrinite, the rest being particles. There is a low to moderate content of spores which fluoresce light orange.

Sample M-6979, 1920 - 1935m: Claystone and limestone, Ro = 0.48 (20)
The sample has a moderate organic content dominated by inertinite. There is some good, clean vitrinite but it appears variable. A few good stringers are recorded. There are signs of oxidation around the edges of clasts but penetration does not appear to be deep. There is both bitumen and iron staining. There is a trace of light orange fluorescing spores.

Sample M-6981, 1950 - 1965m: Claystone and limestone, Ro = 0.49 (20)
The sample has a high organic content which is dominated by inertinite. There are some good vitrinite stringers. There is an overall brown colour due to both bitumen and iron staining. There is some evidence of oxidation. U.V. light shows mid-orange fluorescence from spores which occur in moderate quantities.

Sample M-6984, 1995 - 2010m: Claystone, Ro = 0.46 (21)
Organic material is moderately abundant with vitrinite dominant and inertinite subordinate. There is a high content of bitumen wisps and an overall brown staining from bitumen. There is evidence of oxidation on true rims of clasts. There is a moderate content of spores which fluoresce mid-orange.

Sample M-6987, 2040 - 2055m: Shale/claystone ?, Ro = 0.47 (20)
The shale is rich in organic material with vitrinite dominant but all types well represented. There is a high concentration of bitumen wisps and staining in some areas. U.V. light shows a moderate content of spores fluorescing light orange.

Sample M-6989, 2070 - 2085m: Shale, Ro = 0.52 (19)
The sample is rich in organic material but this is predominantly inertinite followed by reworked vitrinite with only a moderate content of primary vitrinite. The vitrinite is very clean and the statistical distribution of reflectance values is excellent. The sample is brown but this is probably iron staining. There is a moderate content of both light orange and mid-orange fluorescing spores.

Sample M-6990, 2085 - 2138m: Shale and claystone, Ro = 0.52 (20)
The sample is rich in organic material but this is dominantly inertinite. There is some good vitrinite but most is pitted and gnarled. There are some bitumen wisps and bitumen staining though the latter may be overestimated due to a high concentration of iron staining. There is light orange fluorescence from spores and mid-orange fluorescence from small fragments (possibly spores).

Sample M-6993, 2186 - 2201m: Shale and sandstone, Ro = 0.52 (19)
There is a moderate organic content composed mainly of inertinite. There are some good vitrinite stringers. There is some decomposition of pyrite (oxidation). There is a trace of spores which fluoresce light orange.

Sample M-6996, 2231 - 2246m: Coal, claystone and carbonate, Ro = 0.58 (21)
The sample is rich in organic material. The coal is clean and the sediment has a high content of vitrinite and inertinite in approximately equal proportions. There is heavy bitumen staining in the sediment. The coal has a reflectance of approximately 0.64% and this probably indicates bitumen and iron staining has lowered the reflectance in the sediment (if both lithologies are representative of this interval). The coal has a high content of mid orange spores whilst the sediment has a low to moderate content.

Sample M-7001, 2306 - 2321m: Mixed shales and sandstone, Ro = 0.52 (20)
There is a moderate organic content, dominantly small inertinite fragments. There is both bitumen and iron staining and signs of oxidation. The clean vitrinite has very variable reflectances and the distribution is poor. There is light orange and mid-orange fluorescence from spores in moderate quantities.

Sample M-7003, 2336 - 2351m: Coal, Ro = 0.67 (24)
The coal is almost exclusively inertinite. It is highly brecciated and there are many flow structures indicating either heavy oxidation or slight heating (there is no vesiculation except in semi-fusinite). The gradation from semi-fusinite to vitrinite is not very clear. The distribution of values is poor (especially for a coal) and the value would appear to be slightly high. There is mid-orange fluorescence from spores (low quantity) and yellow resins.

Sample M-7005, 2366 - 2381m: Siltstone, shale and carbargillite, Ro = 0.48 (20)
Overall, the sample is moderately rich but the siltstone is very rich in inertinite fragments. The shale has some very good vitrinite stringers. Some vitrinite appears almost bleached. There is some bitumen staining which may have lowered the result. There is mid-orange fluorescence from spores and algae.

Sample M-7010, 2441 - 2456m: Claystone with shale and sandstone, Ro = 0.53 (14)
There is a high concentration of bitumen wisps in some clay lithologies. The rest is dominantly inertinite. The vitrinite is generally very gnarled and pitted. Bitumen staining and iron staining are difficult to distinguish. There is a moderate content of spores fluorescing light orange, a low content of mid-orange spores and some,green/yellow resin.

Rock-Eval Pyrolysis

A total of forty-three samples from the analysed sequence were picked for Rock-Eval Pyrolysis. The results are discussed below.

Zone A. 690-1245 metres. Four claystone samples from this zone were analysed. The low hydrogen indices (29-148) and high oxygen indices (67-235) indicate kerogens which are in part type III kerogens (M-6909 870-885m, M-6913 930-945m) but mostly poor type III or type IV (i.e. consisting mostly of inertinites and/or reworked material). The T_{max} values are very low and probably indicate that some relatively high molecular weight material (introduced bitumen?) is affecting the S_2 peak. The production index values are very high in this zone which suggests that migrated hydrocarbons are present in these claystones. The claystones in samples M-6909 and M-6913 have a fair potential as source rocks for gas.

Zone B. 1245-1545 metres. Four samples from this zone were analysed. The pyrolysis data for these samples is similar to the top sample analysed in zone A. These samples have mainly type IV kerogen, with no source rock potential.

Zones C and D. 1545-1980 metres. Thirteen samples from these two zones were analysed. Hydrogen and oxygen indices are similar to those in zones A and B. Although claystones have generally good TOC values, the kerogens are type III at best, but generally poor type III or type IV kerogen as in zones A and B. T_{max} values show extreme variations, the most reliable values are probably those with the highest TOC values. Below 1920 metres T_{max} values of 430-442 were recorded from type III kerogens which suggests a moderate mature to mature section. The production indices also show a marked decrease below 1920 metres.

Zones A, B and C and D have a generally poor to fair potential as source rocks for gas.

Zone E. 1980-2085 metres. Seven samples were analysed from this zone, which consists wholly of TOC-rich, dark, brownish-grey claystones. The hydrogen and oxygen indices indicate type III kerogen from 1980-1995 metres and mixed type II/III kerogen throughout the rest of the

section. T_{max} values of 430-432 indicate an early mature section. The production indices of 0.1 to 0.14 suggest a mature section with no migrated hydrocarbons. The high value 0.24 in the claystones at the base of this zone might indicate hydrocarbons introduced via sandstones in zone F. The dark brownish-grey claystones have a good - rich potential for gas and oil.

Zone F. 2085-2201 metres. Four samples were analysed from this zone. The dark grey claystones in this section have hydrogen and oxygen indices characteristic of type III kerogen. The T_{max} values are significantly higher than zone D i.e. 434-438 compared with 430-432, which is most probably related to the type of kerogen rather than to maturity. Production indices are higher than in Zone E and associated with the noticeable fluorescence of sandstones (see lithological description) in this zone indicates migrated hydrocarbons. The dark grey claystones have a fair - good potential for gas.

Zone G. 2201-2351 metres. Seven samples were analysed from this zone. Carbonaceous claystones in this zone have hydrogen and oxygen indices of type III kerogens. They are intimately associated with coal(s) which have a slightly higher hydrogen index than the claystones. T_{max} values of 433-440 indicate a mature section. The coal(s) have a good-rich potential for gas. The thin (?) carbonaceous claystones have only a fair potential (for gas). Production indices are still as high as in zone F. Fluorescence is still evident in sandstones.

Zone H. 2351m-TD. Four samples were analysed in this zone. The dark grey, carbonaceous claystones in this zone have higher hydrogen indices and lower oxygen indices than those in zone F, and have more potential (i.e. good) as source rocks for gas. T_{max} values of 437-441 indicate a mature zone. Production indices are low for the most TOC-rich claystones (i.e. 0.07-0.15) and the bitumen is probably mostly indigenous with less introduced hydrocarbons. The carbonaceous claystones and coals have a good-rich potential as source rocks for gas.

PYROLYSIS - GAS CHROMATOGRAPHY

Fifteen samples were analysed using a thermal evaporation/pyrolyses - gas chromatography.

Zones A, B and C.
Three samples were analysed in the section of the well including these three zones. The samples are the same samples which were analysed for extractable organic matter. M-6909, M-6949 and M-6961 (870-885m, 1470-1485m, 1650-1665m).
The first sample M-6909 shows mostly non-homologeus peaks which are probably aromatics. The alkane/alkene homology common in many type I and II kerogens is absent. This distribution with a few aromatic compounds is characteristic for vitrinitic or cooly material. The other two samples are similar, although in M-6949 there are some peaks which are broad or failing (marked with an asterisk) that are probably heterochclic compounds (e.g. phenols). Oxygenated compounds such as these are characteristic for woody material. In M-6961 there is a very slight alkane/alkene homology above nC_{15} which probably represent a small higher plant wax component.

Zones C and D.
Two samples were analysed. They have some of the characteristics of samples M-6949 and M-6961. These samples M-6973 and M-6979 (1830-1845m, 1920-1935m) also show a greater abundance of low molecular weight material. However, the general pattern indicates kerogens consisting of abundant woody material is type III kerogen.

Zones D and E.
Six samples were analysed (one from zone D) in this section, M-6981, M-6983, M-6985, M-6987, M-6988 (depths, 1950-1965m, 1980-1995m, 2010-2025m, 2040-2055m, 2055-2070m). They generally show similar characteristics to each other and are quite different from samples above and below. In some ways the top two samples are intermediate in characteristics between M-6978 and the rest of the samples in zone E. All the pyrograms are marked by an alkane/alkene homology ranging from nC_6 - nC_{30}. Various non-homologous peaks and probably mainly aromatic hydrocarbons. The distributions are indicative of a large microbial lipid component - as in type I and type II kerogens. The Rock-Eval data

and this distribution indicate type II kerogens. The abundance of higher molecular weight n-alkanes/alkenes nC_{20} - nC_{30} points to a significant and plant influence probably from aikcular material which is abundant in this section according to the visual kerogen analysis.

Zones F, G and H.

Four samples were analysed in these zones. M-6993, M-6998, M-7001 and M-7010 (2186-2201m, 2261-2276m, 2306-2321m, 2441-2456m). The dominant alkane/alkene homology of zone E is present but of shorter range only up to nC_{20} - nC_{25}, and low molecular weight material eluting before Toluene (Peak T) is more abundant. The development of broad-tailing peaks (marked with *) is suggestive of organic matter containing more woody (vitrinite/inertinite) material than in zone E. The alkane/alkene homology is generally less prominent relative to aromatics such as the zylenes (Peak X).

CONCLUSIONS

Zones A, B and C.
Lithology consists of some green-grey, but mostly dark grey claystones, with minor limestones and sandstones. TOC values vary from 0.6 - 1.2% above 1710 metres. Below 1710 metres dark grey claystones are interbedded with limestones and sandstones, and the claystones have TOC values greater than 2%. Visual kerogen analysis indicate mainly woody and reworked woody material. Examination in reflected light indicates an abundance of inertinite particles. Rock-Eval pyrolysis indicates that kerogens are mostly type III or type IV kerogen. However, examination in reflected light does indicate that the samples are slightly richer in vitrinite particles below 1650 metres. The production indices are high and indicates migrated hydrocarbons in a section which is moderate mature (%Ro = 0.39 - 0.51, Spore Colour 1+/2, yellow to light orange spore fluorescence).

Extraction data also indicate the presence of introduced hydrocarbons in this section and above, with very high percentage hydrocarbons particularly the top two samples. 73% and 60% and all four samples extracted in this section show a high saturate/aromatic ratio.

Zone D, 1905 - 1980 metres.
Lithology consists mostly of dark grey claystones interbedded with red-brown claystones and grey limestones. TOC values vary from 1.5 - 2.6% for the dark grey claystone and less than 0.5% for the other lithologies. Above 1950 metres visual kerogen analyses indicates there may be some cuticular material present. Examination in reflected light show an increase in exinite. Rock-Eval indicates poor type III or type IV kerogen changing between 1950 and 1965 metres to type III kerogen. This transition is marked by a change in the pyrogram (pyrolysis - gas chromatogram) traces. M-6979 from 1920-1935 metres shows only a minor alkane/alkene homology and the dominant peaks are aromatics and heterocyclic compounds whereas in M-6981 it is clear that the alkane/alkene homology is dominant from nC_8 - nC_{30}. Below 1845 metres in zone C the Rock-Eval production indices are much lower than above that level, although still too high for what is at most an early mature zone (%Ro = 0.48-0.49, light-mid-orange spore fluorescence spore colour 1+/2).

Zone E, 1980 - 2085 metres.
Consists almost completely of dark grey and dark brownish grey claystones with TOC values increasing from 3.4% at 1995 metres to 10.4% at 2085 metres. Visual kerogen analyses indicates that the organic matter is dominated by cuticular material. Examination in reflected light indicates high concentrations of bitumen wisps. Rock-Eval pyrolysis indicates mainly mixed type II/III kerogens in the zone (Hydrogen indices 200-300, oxygen indices less than 10). This zone is moderate to early mature (%Ro = 0.46 - 0.52, light to mid-orange spore fluorescence and 1+/2 spore colour). T_{max} values in this zone are from 430-434 which suggests early mature kerogens. The production indices are low relative to values from higher up the well. However the values are quite high and the n-alkane distributions of samples from this zone are dominated by low molecular weight components between nC_{10} - nC_{15}. It is probable that this material represents in part migrated hydrocarbons. The dark claystones in this zone have a good - rich potential as source rocks for gas and oil (paraffinic).

Zone F, 2085 - 2200 metres.
Consists of sandstones and some dark claystones. The sandstones show a dull gold fluorescence and slight (yellow) e.a. streaming cut - indicating the presence of migrated hydrocarbons. A gas chromatogram of the saturated hydrocarbons from the sandstones show a n-alkane distribution from C_{15} - nC_{40} with maximum between nC_{22} - nC_{40} - suggesting that they are mostly residual hydrocarbons.
Claystones in this section have TOC values from 2.7 to 3.4%. Visual kerogen analysis indicates a similar composition for organic matter in this and zone E. However, Rock-Eval pyrolysis data indicates mostly type III kerogen. Pyrograms change with the n-alkane/alkene homology being less prominent than in zone E. Maturity parameters indicate a zone which is early mature (%Ro = 0.52, spore colour 2-/2, light orange spore fluorescence). Minor (?) claystones in this zone have a fair to good potential as source rocks for gas.

Zones G and H, 2200 - 2501 metres.
Consist of sandstones with subordinate dark grey partly carbonaceous claystones and coal. TOC values of the claystones vary, between 2201-2350 metres they average 2.5%, below 2350 metres they average 5.4%. There appears to be a slight change in Rock-Eval hydrogen indices

at this boundary being slightly higher below 2350 metres. However Rock-Eval data indicates predominantly type III kerogen. The visual kerogen analysis indicates that there is less cuticular material than in zone E, and other terrestrial debris including woody material and Botryococcus algae. Examination in reflected light indicates the presence of resinite in the coal(s). Throughout this section of the well is early mature to oil window mature (%Ro = 0.48 - 0.67 2/2- spore colour, light to mid-orange spore fluorescence). The subordinate claystones have a fair to good potential as source rocks for gas. The coal(s) have a rich potential for gas. The sandstones throughout this section of the well contains migrated hydrocarbons based on the fluorescence and cut visible in ultraviolet light. Also the n-alkane distributions of the claystones are dominated by hydrocarbons between nC_{11} - nC_{20}. The gas chromatogram of the saturated hydrocarbons of the coal (M-7003) is also marked by some unusual features. The n-alkane distribution has a maximum at nC_{23} and there is only a slight odd n-alkane predominance. The n-alkane distribution centring on nC_{23} may represent residual hydrocarbons similar to the distribution in the sandstone (M-6991).

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

	IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4/nC4
1	6897	705	10291	1041	720	182	368	703	12602	2310	18.33	0.49
1	6901	765	6161	385	286	99	116	176	7047	886	12.57	0.85
1	6905	825		O P E N	L I D							
1	6909	885	30647	4738	3618	756	1176	914	40933	10287	25.13	0.64
1	6913	945	60195	5339	4031	1045	2210	3175	72819	12625	17.34	0.47
1	6917	1005	25876	7706	8535	2737	4646	8996	49500	23624	47.73	0.59
1	6921	1065		O P E N	L I D							
1	6922	1080	18941	4557	3648	782	1298	1649	29225	10284	35.19	0.60
1	6925	1125	21034	4364	3063	696	973	1276	30130	9096	30.19	0.72
1	6929	1185	30182	4834	4941	1389	2109	3726	43454	13273	30.54	0.66
1	6933	1245	8981	1784	964	227	242	221	12198	3217	26.38	0.94
1	6937	1305	40	12	34	0	0	0	85	46	53.29	
1	6941	1365	179	0	0	0	0	0	179	0	0.00	
1	6945	1425	7023	1726	1501	333	292	225	10877	3853	35.43	1.14
1	6949	1485	78	0	0	0	0	0	78	0	0.00	
1	6953	1545			NO DETERMINATION POSSIBLE							
1	6957	1605	14341	2439	1735	322	244	148	19081	4740	24.84	1.32
1	6961	1665	48256	9563	5123	897	623	349	64462	16206	25.14	1.44
1	6965	1725	10273	10474	15200	4143	3350	3440	43441	33168	76.35	1.24
1	6969	1785	13691	3298	3107	703	477	351	21277	7586	35.65	1.47
1	6973	1845	18330	4686	5155	962	676	433	29809	11479	38.51	1.42
1	6977	1905	26176	3897	2438	229	263	126	33002	6826	20.68	0.87
1	6978	1920	52083	7149	4088	490	454	354	64265	12181	18.95	1.08

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4/nC4
1 6979	1935	1833	338	220	26	0	0	2417	584	24.17	
1 6980	1950	6789	1355	1096	134	191	164	9565	2776	29.02	0.71
1 6981	1965	24081	5936	7918	930	2865	2751	41730	17649	42.29	0.32
1 6982	1980	22760	5768	8990	873	2715	1487	41107	18347	44.63	0.32
1 6983	1995	29415	7964	12312	1106	3531	1379	54327	24913	45.86	0.31
1 6984	2010	2682	835	1524	141	529	265	5711	3029	53.04	0.27
1 6985	2025	2165	615	1018	90	334	136	4222	2057	48.72	0.27
1 6986	2040	44476	13229	23525	1942	8256	4813	91429	46952	51.35	0.24
1 6987	2055	58762	14326	11313	795	2951	1419	88146	29385	33.34	0.27
1 6988	2070	45915	7076	4206	294	832	328	58323	12408	21.28	0.35
1 6989	2085	83497	14662	5410	423	1143	589	105135	21638	20.58	0.37
1 6990	2138	1133	884	1273	175	431	476	3896	2763	70.93	0.41
1 6991	2173	7987	1535	890	136	239	429	10787	2800	25.96	0.57
1 6992	2186	3873	1816	225	0	278	449	6192	2319	37.46	0.00
1 6993	2201	23059	6135	1876	270	417	589	31757	8697	27.39	0.65
1 6994	2216	4523	1087	598	67	122	226	6397	1874	29.30	0.55
6995	2231	47081	9650	2020	197	321	507	59268	12187	20.56	0.61
6996	2246	75708	19326	3761	361	551	776	99707	23999	24.07	0.65
6997	2261	9531	2246	772	97	155	345	12801	3270	25.54	0.63
6998	2276	24020	2856	609	85	102	193	27672	3651	13.20	0.84
6999	2291	6007	1141	282	45	59	142	7535	1528	20.28	0.76
7000	2306	54329	6764	1795	221	338	326	63448	9118	14.37	0.65
7001	2321	4438	1274	610	83	137	181	6542	2104	32.16	0.60

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4/nC4
7002	2336	26898	5345	1861	177	241	175	34522	7624	22.08	0.73
7003	2351	56261	4945	1195	137	139	146	62676	6415	10.24	0.98
7004	2366	26004	3225	1133	146	161	105	30669	4665	15.21	0.90
7005	2381	17158	2022	691	87	88	51	20046	2888	14.40	0.98
7006	2396	5249	885	390	47	57	53	6628	1379	20.81	0.82
7007	2411	7889	1677	593	53	58	37	10270	2381	23.18	0.91
7010	2456	14194	1270	447	52	45	149	16008	1814	11.33	1.14
7013	2501	1117	294	281	29	36	64	1758	640	36.43	0.82

DATE : 18 - 8 - 82.

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS .

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
6897	705	83	63	121	62	226	1599	553	471	85.07	0.27
6901	765	34	5	10	13	31	110	93	59	63.37	0.40
6905	825		O P E N L I D								
6909	885	40	11	28	20	63	139	162	122	75.53	0.33
6913	945	64	34	30	26	105	357	259	195	75.32	0.25
6917	1005	255	27	69	73	185	1538	608	353	58.07	0.40
6921	1065		O P E N L I D								
6922	1080	56	48	146	93	231	772	574	518	90.17	0.40
6925	1125	150	102	288	156	368	941	1064	914	85.89	0.42
6929	1185	158	22	49	36	145	614	410	253	61.59	0.25
6933	1245	67	86	254	119	235	396	761	694	91.14	0.51
6937	1305	82	39	240	131	268	539	760	679	89.27	0.49
6941	1365	93	17	142	99	171	302	522	429	82.15	0.58
6945	1425	96	101	378	143	231	213	949	853	89.92	0.62
6949	1485	69	43	256	93	171	163	632	563	89.08	0.55
6953	1545	117	87	382	128	204	152	918	801	87.25	0.63
6957	1605	168	197	574	174	254	196	1367	1199	87.69	0.68
6961	1665	448	1045	1936	516	672	476	4618	4170	90.29	0.77
6965	1725	678	283	935	364	571	998	2830	2152	76.03	0.64
6969	1785	977	1220	2368	642	1002	1857	6210	5232	84.26	0.64
6973	1845	104	159	514	131	172	340	1079	975	90.38	0.76
6977	1905	507	1217	2825	341	564	315	5455	4947	90.70	0.61
6978	1920	526	991	2295	302	447	238	4560	4034	88.46	0.68

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS .

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
6979	1935	395	932	2269	382	591	513	4568	4173	91.36	0.65
6980	1950	386	759	1956	286	495	332	3882	3495	90.05	0.58
6981	1965	219	567	2608	398	1751	1363	5542	5323	96.05	0.23
6982	1980	700	1533	6526	1121	4971	3938	14852	14152	95.29	0.23
6983	1995	1046	2693	12585	2442	10934	8231	29700	28654	96.48	0.22
6984	2010	1627	4453	23117	4810	21238	15930	55243	53616	97.06	0.23
6985	2025	2740	6215	30035	6146	29297	26190	74434	71693	96.32	0.21
6986	2040	3603	7234	32697	6670	32659	31559	82863	79260	95.65	0.20
6987	2055	7012	10128	21677	3354	14044	9454	56215	49203	87.53	0.24
6988	2070	26840	35761	56096	7294	26694	15057	152685	125844	82.42	0.27
6989	2085	43415	50666	36058	4487	14204	8546	148829	105415	70.83	0.32
6990	2138	490	1633	5167	1062	3976	3817	12328	11838	96.02	0.27
6991	2173	3567	2545	4196	1013	2718	4614	14039	10472	74.59	0.37
6992	2186	2003	2128	3206	693	1769	3186	9798	7796	79.56	0.39
6993	2201	14487	15247	8461	1347	3724	6412	43266	28779	66.52	0.36
6994	2216	2335	2808	4125	855	2070	2737	12192	9858	80.85	0.41
6995	2231	16014	13377	6299	865	2634	4570	39188	23175	59.14	0.33
6996	2246	37806	26493	9027	1044	2886	4866	77256	39450	51.06	0.36
6997	2261	4116	6851	5318	947	2699	8428	19930	15813	79.35	0.35
6998	2276	9965	8806	3534	568	1476	5713	24350	14384	59.07	0.38
6999	2291	3191	4895	2117	387	999	3678	11590	8399	72.46	0.39
7000	2306	4114	4578	2107	387	987	2530	12173	8059	66.20	0.39
7001	2321	1066	1765	1887	418	1322	2362	6457	5391	83.49	0.32

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS .

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4/nC4
1	7002 2336	8613	5698	3723	668	1762	2320	20463	11850	57.91	0.38
1	7003 2351	141508	79633	23049	3219	4156	1842	251565	110057	43.75	0.77
1	7004 2366	13140	9605	5646	1046	2003	1852	31441	18301	58.21	0.52
1	7005 2381	16408	10569	6786	1291	2278	1835	37332	20924	56.05	0.57
1	7006 2396	4983	4628	3726	694	1484	1654	15515	10531	67.88	0.47
1	7007 2411	39170	26874	13386	1972	3082	1564	84483	45314	53.64	0.64
1	7010 2456	13114	9281	6019	672	1334	1654	30419	17305	56.89	0.50
1	7013 2501	459	612	1308	274	1039	2978	3692	3233	87.57	0.26

DATE : 18 - 8 - 82.

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib) .

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4/nC4
6897	705	10374	1104	840	243	593	2303	13155	2781	21.14	0.41
6901	765	6195	391	295	111	148	286	7140	945	13.23	0.75
6905	825		O P E N	L I D							
6909	885	30686	4749	3646	776	1239	1054	41095	10409	25.33	0.63
6913	945	60259	5373	4061	1071	2315	3532	73078	12819	17.54	0.46
6917	1005	26131	7733	8603	2810	4831	10534	50108	23977	47.85	0.58
6921	1065		O P E N	L I D							
6922	1080	18998	4605	3794	874	1529	2421	29799	10801	36.25	0.57
6925	1125	21184	4467	3351	851	1341	2217	31194	10011	32.09	0.63
6929	1185	30339	4857	4990	1425	2253	4341	43864	13525	30.83	0.63
6933	1245	9048	1871	1218	345	477	617	12959	3911	30.18	0.72
6937	1305	121	51	274	131	268	539	846	724	85.64	0.49
6941	1365	273	17	142	99	171	302	702	429	61.15	0.58
6945	1425	7119	1828	1879	476	524	438	11825	4706	39.80	0.91
6949	1485	147	43	256	93	171	163	709	563	79.30	0.55
6953	1545	117	87	382	128	204	152	918	801	87.25	0.63
6957	1605	14509	2636	2308	496	499	344	20448	5938	29.04	0.99
6961	1665	48704	10609	7059	1413	1295	825	69080	20376	29.50	1.09
6965	1725	10951	10757	16135	4507	3920	4438	46271	35320	76.33	1.15
6969	1785	14668	4519	5475	1345	1479	2208	27486	12818	46.63	0.91
6973	1845	18434	4844	5669	1093	848	773	30888	12454	40.32	1.29
6977	1905	26683	5114	5262	570	827	441	38456	11773	30.61	0.69
6978	1920	52610	8140	6383	792	901	592	68825	16215	23.56	0.88

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib) .

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
6979	1935	2228	1270	2489	408	591	513	6985	4758	68.11	0.69
6980	1950	7176	2113	3052	420	685	496	13447	6271	46.64	0.61
6981	1965	24300	6503	10526	1328	4616	4114	47272	22973	48.60	0.29
6982	1980	23460	7301	15516	1994	7687	5425	55959	32499	58.08	0.26
6983	1995	30460	10658	24897	3548	14464	9610	84027	53567	63.75	0.25
6984	2010	4309	5288	24640	4951	21767	16195	60954	56646	92.93	0.23
6985	2025	4905	6830	31053	6236	29631	26327	78656	73750	93.76	0.21
6986	2040	48079	20463	56222	8612	40915	36372	174292	126213	72.41	0.21
6987	2055	65774	24454	32989	4149	16994	10873	144361	78587	54.44	0.24
6988	2070	72755	42836	60302	7588	27526	15385	211008	138253	65.52	0.28
6989	2085	126911	65328	41468	4910	15347	9135	253964	127053	50.03	0.32
6990	2138	1623	2517	6440	1237	4407	4293	16223	14601	90.00	0.28
6991	2173	11554	4080	5085	1149	2957	5042	24826	13272	53.46	0.39
6992	2186	5876	3944	3431	693	2047	3635	15991	10115	63.26	0.34
6993	2201	37547	21382	10337	1617	4140	7000	75023	37476	49.95	0.39
6994	2216	6858	3895	4723	922	2192	2963	18590	11732	63.11	0.42
6995	2231	63095	23027	8318	1062	2955	5077	98457	35362	35.92	0.36
6996	2246	113514	45819	12788	1405	3437	5642	176963	63449	35.85	0.41
6997	2261	13647	9097	6089	1044	2853	8774	32730	19083	58.30	0.37
6998	2276	33986	11661	4143	654	1578	5907	52021	18036	34.67	0.41
6999	2291	9198	6036	2399	433	1059	3819	19125	9926	51.90	0.41
7000	2306	58444	11342	3902	608	1325	2856	75620	17177	22.71	0.46
7001	2321	5504	3039	2497	501	1459	2544	12999	7496	57.66	0.34

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib) .

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4/nC4
7002	2336	35511	11043	5583	845	2003	2495	54985	19474	35.42	0.42
7003	2351	197769	84577	24243	3356	4296	1988	314241	116473	37.06	0.78
7004	2366	39144	12831	6779	1192	2164	1957	62109	22965	36.98	0.55
7005	2381	33566	12590	7476	1378	2367	1886	57377	23811	41.50	0.58
7006	2396	10232	5513	4116	741	1541	1708	22143	11911	53.79	0.48
7007	2411	47059	28551	13979	2024	3140	1600	94753	47694	50.34	0.64
7010	2456	27308	10550	6466	724	1379	1803	46427	19119	41.18	0.52
7013	2501	1576	906	1590	303	1074	3042	5450	3873	71.08	0.28

DATE : 18 - 8 - 82.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-6897	690-720	0.90	95% Claystone, grey, micromicaceous, non calcareous, very slightly carbonaceous, grading to.
			5% clayey Sandstone, grey, fine, subangular, glauconitic, very slightly pyritic.
M-6901	750-765		10% Cement.
		0.70	90% Claystone, grey, occasionally very slightly micromicaceous, non calcareous, some very slightly pyritic and carbonaceous.
M-6905	810-825	0.58	100% Claystone, grey - light grey, non calcareous - very slightly calcareous, some deformed fragments.
M-6909	870-885	1.17	100% Claystone, grey - slightly greenish, grey, occasionally glauconitic, disintegrates in 10% HCl.
M-6913	930-945	1.03	80% Sandy Claystone grey - greenish, grey, micromicaceous, partly glauconitic, occasionally micaceous.
		0.32	20% Siltstone, brown - yellowish, brown, ?sideritic
			Abundant Pyrite (xln).
			Sm.am. Limestone; calcareous Claystone.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-6917	990-1005		Observed "pipe dope" on some of the fragments.
		0.84	90% Claystone, grey - dark grey, greenish grey, occasionally sandy, slightly glauconitic in parts, partly subfissile, slightly soapy.
			7% Claystone, brown - yellowish brown, ?sideritic.
			3% Sandstone, clayey, glauconitic, fine - very fine, subangular, micaceous.
			Sm.am. Glauconite; Pyrite; Claystone, light grey, with spots of calcareous fragments.
M-6922	1065-1080	0.71	95% Claystone, grey - dark grey, greenish grey, occasionally sandy and glauconitic as above.
			3% Claystone, brown, sideritic.
			2% Sandstone as above.
M-6925	1110-1125	0.92	95% Claystone, grey - dark grey, occasionally sandy and glauconitic, increase in content of finely dispersed framboidale Pyrite in the darkest claystones, slightly calcareous.
			2% Claystone, brown, sideritic.
			3% Sandstone, as above.
M-6929	1170-1185	0.84	100% Claystone, grey - dark grey, some subfissile, very slightly calcareous, obs, soapy fragments, occasionally pyritic.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-6933	1230-1245	0.88	98% Claystone, dark grey - grey, slightly micromicaceous, very slightly calcareous - non calcareous. 2% sideritic Claystone, brown. Sm.am. Pyrite.
M-6937	1290-1305	1.02	100% Claystone, dark grey, grey, some silty and sandy, occasionally slightly glauconitic, micromicaceous, partly pyritic, observed soapy fragments. Sm.am. Sandstone, grey, clayey; sideritic Claystone brown.
M-6941	1350-1365	0.89	100% Claystone dark grey, grey as above. Sm.am. as above.
M-6945	1410-1425	1.09	100% Claystone, dark grey, grey very slightly calcareous, occasionally silty, sandy, partly micromicaceous and very slightly carbonaceous. Sm.am. as above.
M-6949	1470-1485	1.09	100% Claystone, dark grey, slightly carbonaceous, occasionally lustrous, partly subfissile, slightly pyritic. Sm.am. sideritic Claystone, brown - light brown; ?Chert, brown.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-6953	1530-1545	1.12	95% Claystone, dark grey, lustrous micromicaceous, subfissile - fissile, slightly carbonaceous. 2% sideritic Claystone yellowish brown. 1% Limestone, greyish white. 1% Sandstone, fine, glauconitic. Sm.am. Pyrite; Sand, medium, subrounded; Claystone, redbrown, subfissile, non calcareous; Chert.
M-6957	1590-1605	1.17	82% Claystone, dark grey, lustrous as above.
		0.89	15% marly Limestone, light brownish white. 3% sideritic Claystone. Sm.am. Sandstone as above, medium - coarse, subangular, etched surface; Pyrite; Claystone, redbrown, sandy, subfissile.
M-6961	1650-1665	1.56	70% Claystone, dark grey, lustrous, as above.
		1.03	20% marly/clayey Limestone, greyish white - light brownish white. 5% Sideritic Claystone/Siderite, as above. 5% Sand/Sandstone, medium, fine, calcarerous. Sm.am. as above.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-6965	1710-1725	2.18	40% Claystone, dark grey, as above. 50% Sandstone, greyish white, fine, argillaceous, slightly carbonaceous, non calcareous - very slightly calcareous. 10% Limestone, clayey, light brownish grey - white. Abundant steel fragments from core. Sm.am. Cement.
M-6969	1770-1785	-	95% Sandstone, greyish white, very fine - fine, argillaceous, subangular - subrounded, occasionally very calcareous, micromicaceous, occasionally slightly carbonaceous. 5% Limestone as above. Abundant steel fragments. Sm.am. Claystone, dark grey; Pyrite.
M-6973	1830-1845	2.28 0.90	70% Claystone, dark grey, micromicaceous, occasionally slightly lustrous. 20% Marl/Limestone, light brownish, white - grey. 10% Sandstone
M-6977	1890-1905	1.74	96% Claystone, dark grey, grey, some greyish black, micromicaceous - micaceous, subfissile. occasionally lustrous, non calcareous. 3% marly Limestone as above. 1% Claystone, redbrown, subfissile, occasionally sandy. Sm.am. Cement.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-?

Sample	Depth (m)	TOC	Lithology
M-6978	1905-1920	1.47	70% Claystone, dark grey, grey as above.
		0.29	15% Claystone, sandy, redbrown, calcareous, micaceous.
			4% Sand, medium - fine, red iron-oxide coating.
			1% Limestone, white
			Abundant steel fragments.
M-6979	1920-1935	2.56	65% Claystone, dark grey, some greyish black, as above.
		0.26	25% Claystone, redbrown as above.
			10% Limestone, greyish white occasionally redbrown.
			Abundant steel fragments.
			Sm.am. Sand, fine - medium as above.
M-6980	1935-1950	1.67	55% Claystone, dark grey - grey as above.
		0.24	40% Limestone, greyish white occasionally pyritic. Yellow fluorescence, with very weak whitish cut.
			5% Claystone, redbrown as above.
			Abundant steel fragments.
			Sm.am. Sand as above; Pyrite.
M-6981	1950-1965	2.29	80% Claystone, dark grey, greyish, black grey, brownish grey, decreasing Mica content, non calcareous, lustrous in part.
		0.39	20% Limestone, greyish white light brownish grey.
			Abundant steel fragments; Pyrite.
			Sm.am. Claystone, redbrown.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-6982	1965-1980	2.18	90% Claystone, dark greyish black - dark grey, brownish dark grey, partly micromicaceous and lustrous, subfissile.
		0.46	10% Limestone as above. Abundant steel fragments.
			Sm.am. Claystone,
M-6983	1980-1995	3.41	100% Claystone, dark brownish grey, greyish black, as above , occasionally waxy.
			Sm.am. Limestone, greyish white; Claystone redbrown; Steel fragments.
M-6984	1995-2010	4.05	100% Claystone, dark brownish grey, greyish black as above.
			Sm.am. As above.
M-6985	2010-2025	4.28	100% Claystone, dark brownish, grey, greyish black as above.
			Sm.am. As above.
M-6986	2025-2040	4.84	100% Claystone, dark greyish black, micromicaceous, subfissile, partly lustrous, non calcareous.
M-6987	2040-2055	7.92	100% Claystone as above, micaceous - micromicaceous, observed Coal.
M-6988	2055-2070	9.62	100% Claystone, dark greyish black, dark brownish grey - black, as above, occasionally slightly calcareous.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology	
M-6989	2070-2085	10.40	96%	Claystone as above occasionally slightly calcareous.
			3%	Sandstone, clear, medium fine, angular - subangular, good sorting, non calcareous.
			1%	Kaolin.
M-6990	2085-2138		12%	Lost circulation material.
		3.41	85%	Claystone, dark grey, dark bluish grey, greyish black, non micaceous - micromicaceous, mostly fissile, occasionally lustrous.
			3%	Claystone, red-brown, micromicaceous, subfissile.
				Some contamination of fragments by "?Pipe dope".
M-6991	2138-2173		70%	Sandstone, white - greyish, white, medium - fine, coarse, angular, calcareous, occasionally slightly micaceous.
			5%	?Kaolin, white, greyish white.
		3.0	20%	Claystone, dark grey - greyish black, as above.
			5%	Claystone, grey, very hard, laminated, this lithology seems to be affected by drilling.
			Sm.am.	Claystone, red-brown.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology	
M-6992	2173-2186		70%	Sandstone, white - greyish, white, medium, fine, coarse observed some very coarse angular, non calcareous, occasionally very slightly glauconitic, some staining.
		2.95	25%	Claystone, dark grey - greyish black as above.
			3%	Kaolin.
			2%	Claystone, grey - light grey interbedded, affected by drilling.
			Sm.am.	Claystone, red-brown, some contamination by "pipe dope".
M-6993	2186-2201		58%	Sandstone, light brownish, white - greyish white, fine, fine - medium angular, non calcareous, some slightly carbonaceous, slightly micaceous, ?kaolinitic. Dull gold fluorescence and very slight yellowish streaming cut.
		2.70	40%	Claystone, dark greyish black as above.
			2%	Kaolin.
			Sm.am.	Claystone, red-brown. Same contamination as above.
M-6994	2201-2216		10%	Sandstone, light brownish, grey, greyish white, fine, fine - very fine, fine - medium, as above.
		0.74	20%	?Kaolin/kaolinitic Claystone, white - greyish white.
		2.38	65%	Claystone, greyish black - grey, occasionally micromicaceous, some fissile, pyritic.
			5%	Claystone, red-brown as above. Some contamination as above.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology	
M-6995	2216-2231		45%	Sandstone, light brownish white - greyish white, fine fine - very fine, fine medium angular, slightly calcareous, slightly micaceous, occasionally slightly carbonaceous. Fluorescence and cut as in M-6993.
			4%	Kaolin.
		2.38	45%	Claystone, dark grey - greyish black as above.
			5%	Claystone, red-brown, slightly calcareous.
			1%	Coal/carbonaceous Claystone. Some contamination as above.
M-6996	2231-2246		55%	Sandstone, greyish white, light brownish grey, fine - medium, subangular, argillaceous, occasionally slightly micaceous, non calcareous, some slightly carbonaceous. Fluorescence and cut as M-6993.
		4.35	40%	Claystone, dark grey, brownish black, occasionally carbonaceous.
			3%	Kaolin.
			2%	Coal/carbonaceous Claystone. Abundant Claystone, red-brown.
M-6997	2246-2261		90%	Sandstone, light brownish, grey - white, greyish white as above, slightly calcareous. Fluorescence as above.
			2%	Kaolin.
			3%	Claystone, brownish black, very micaceous.
			5%	Claystone, grey - greyish black.
			Sm.am.	Claystone, red-brown; Coal.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology	
M-6998	2261-2276		80%	Sandstone, white, very fine, very fine - fine, angular, argillaceous, non calcareous. Fluorescence and cut as for M-6993.
			10%	Sandstone, silty, light brown, micaceous, occasionally slightly calcareous, often carbonaceous.
		2.90	10%	Claystone, grey - dark greyish black, occasionally waxy.
			Sm.am.	Coal, Claystone, red-brown.
M-6999	2276-2291		90%	Sandstone white as above, occasionally with Mica rich laminations. Fluorescent but little or no cut.
			5%	Sandstone, light brown as above.
			5%	Claystone, grey, dark greyish black as above.
M-7000	2291-2300		65%	Sandstone, white, greyish white, fine, very fine - fine, medium - fine, argillaceous, very slightly calcareous - non calcareous. Dull yellow-brown fluorescence generally with ~~no~~ slight cut for sandstones below this level.
			10%	Sandstone, light brownish grey - dark brownish grey, very fine - fine, fine - medium, angular, micaceous, occasionally carbonaceous.
			5%	Kaolin.
		2.33	15%	Claystone, dark grey - black.
			5%	Claystone, grey, greenish grey, red-brown.
				Some contamination by "pipe dope".
			Sm.am.	Coal/carbonaceous Claystone.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology	
M-7001	2306-2321		65%	Sandstone, white, greyish white, fine - medium, fine, angular as above.
			5%	Kaolin.
			5%	Sandstone, brownish grey as above.
		2.08	20%	Claystone, dark grey - greyish black as above, occasionally waxy.
			3%	Claystone, red-brown.
				Some contamination as above.
M-7002	2321-2336		80%	Sandstone/Sand, greyish white, white, coarse, medium, fine, angular, as above.
			5%	Kaolin.
		1.80	15%	Claystone, dark greyish black, grey.
			Sm.am.	Claystone, red-brown; Coal.
M-7003	2336-2351		40%	Sandstone, greyish white as above, calcareous.
			5%	Kaolin.
		2.04	5%	Claystone, grey dark grey, as above.
		62.09	50%	Coal/carbonaceous Claystone.
M-7004	2351-2366		65%	Sandstone, white - greyish white, fine, fine - medium, fine - very fine, non calcareous, occasionally with Mica rich laminations, slightly carbonaceous.
			5%	Kaolin.
		3.84	30%	Claystone, dark grey - greyish black occasionally grading to carbonaceous Claystone.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-7005	2366-2381		55% Sandstone, greyish white, occasionally light brownish white, medium, fine, coarse, angular, as above.
			5% Kaolin.
		9.17	40% Claystone, dark greyish black - grey, as above.
			Sm.am. Pyrite.
M-7006	2581-2396		80% Sand/Sandstone, white, clear, coarse, medium, fine, angular, micaceous.
			2% Kaolin.
		5.07	18% Claystone, dark greyish black - grey as above.
			Sm.am. Claystone, redbrown.
M-7007	2396-2411		70% Sandstone, greyish white, medium, fine some coarse, angular, occasionally carbonaceous.
			15% Coal.
		4.68	10% carbonaceous Claystone, greyish black.
			2% Kaolin.
			3% Claystone, grey.
			Sm.am. Claystone, redbrown, wood fragments, (pyritized).
M-7010	2441-2456		70% Sandstone, greyish white, fine - medium, as above.
			13% Sand, very coarse, coarse, angular.
			4% Kaolin.
		7.42	13% Claystone, dark greyish black - black, grading to carbonaceous Claystone/coal.
			Sm.am. as above.

IKU

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7120/8-2

Sample	Depth (m)	TOC	Lithology
M-7013	2486-2501		59% Sandstone, greyish white, light brownish grey, medium, fine, angular as above.
			1% Kaolin.
			5% Claystone dark grey - greyish black.
		2.05	30% Claystone, grey.
			5% Claystone light brown slightly calcareous.
			Observed ? ooliths.

IKU

T A B L E : 3.

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKU-No	DEPTH (m)	Rock Extr. (g)	EOM (mg)	Sat. (mg)	Aro. (mg)	HC (mg)	Non HC (mg)	TOC (%)
M 6909	885.00	15.8	4.8	1.9	1.6	3.5	1.3	1.17
M 6949	1485.00	13.2	3.0	1.1	0.7	1.8	1.2	1.18
M 6961	1665.00	12.9	7.0	1.2	0.7	1.9	5.1	1.56
M 6973	1845.00	8.3	9.1	2.9	1.9	4.8	4.3	2.28
M 6979	1935.00	3.6	4.7	1.6	1.2	2.8	1.9	2.56
M 6980 1st	1950.00	3.1	1.3	0.8	0.5	1.3	0.0	0.18
M 6981	1965.00	6.3	7.3	1.5	1.9	3.4	3.9	2.29
M 6984	2010.00	52.7	140.3	33.3	37.5	70.8	69.5	4.05
M 6987	2055.00	40.8	197.0	51.2	52.2	103.4	93.6	7.92
M 6989	2085.00	35.9	175.0	24.7	32.8	57.5	117.5	10.40
M 6991 sst	2173.00	5.6	1.9	0.8	0.6	1.4	0.5	0.01
M 6993	2201.00	9.9	25.3	4.6	6.1	10.7	14.6	2.70
M 6996	2246.00	10.5	61.3	7.6	15.0	22.6	38.7	4.35
M 7001	2321.00	10.3	12.3	1.9	2.1	4.0	8.3	2.08
M 7003 coal	2351.00	1.3	40.0	4.4	3.8	8.2	31.8	78.31
M 7005	2381.00	10.8	19.5	2.3	3.9	6.2	13.3	9.17

DATE : 10 - 11 - 82.

IKU

T A B L E : 4.

WEIGHT OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm OF rock)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
M 6909	885.00	304	120	101	222	82
M 6949	1485.00	227	83	53	136	91
M 6961	1665.00	543	93	54	147	395
M 6973	1845.00	1096	349	229	578	518
M 6979	1935.00	1306	444	333	778	528
M 6980 1st	1950.00	429	273	156	429	0
M 6981	1965.00	1159	238	302	540	619
M 6984	2010.00	2662	632	712	1343	1319
M 6987	2055.00	4828	1255	1279	2534	2294
M 6989	2085.00	4875	688	914	1602	3273
M 6991 sst	2173.00	339	143	107	250	89
M 6993	2201.00	2556	465	616	1081	1475
M 6996	2246.00	5838	724	1429	2152	3686
M 7001	2321.00	1194	184	204	388	806
M 7003 coal	2351.00	30769	3385	2923	6308	24462
M 7005	2381.00	1806	213	361	574	1231

DATE : 10 - 11 - 82.

IKU

T A B L E : 5.

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
M 6909	885.00	26.0	10.3	8.7	18.9	7.0
M 6949	1485.00	19.3	7.1	4.5	11.6	7.7
M 6961	1665.00	34.8	6.0	3.5	9.4	25.3
M 6973	1845.00	48.1	15.3	10.0	25.4	22.7
M 6979	1935.00	51.0	17.4	13.0	30.4	20.6
M 6980 1st	1950.00	238.1	151.5	86.6	238.1	0.0
M 6981	1965.00	50.6	10.4	13.2	23.6	27.0
M 6984	2010.00	65.7	15.6	17.6	33.2	32.6
M 6987	2055.00	61.0	15.8	16.2	32.0	29.0
M 6989	2085.00	46.9	6.6	8.8	15.4	31.5
M 6991 sst	2173.00	3392.9	1428.6	1071.4	2500.0	892.9
M 6993	2201.00	94.7	17.2	22.8	40.0	54.6
M 6996	2246.00	134.2	16.6	32.8	49.5	84.7
M 7001	2321.00	57.4	8.9	9.8	18.7	38.7
M 7003 coal	2351.00	39.3	4.3	3.7	8.1	31.2
M 7005	2381.00	19.7	2.3	3.9	6.3	13.4

DATE : 10 - 11 - 82.

IKU

T A B L E : 6.

COMPOSITION IN % OF MATERIAL EXTRACTED FROM THE ROCK

IKU-No	DEPTH (m)	Sat / EOM	Aro / EOM	HC / EOM	SAT / Aro	Non HC / EOM	HC / Non HC
M 6909	885.00	39.6	33.3	72.9	118.8	27.1	269.1
M 6949	1485.00	36.7	23.3	60.0	157.1	40.0	150.(
M 6961	1665.00	17.1	10.0	27.1	171.4	72.9	37.3
M 6973	1845.00	31.9	20.9	52.7	152.6	47.3	111.(
M 6979	1935.00	34.0	25.5	59.6	133.3	40.4	147.4
M 6980 lst	1950.00	63.6	36.4	100.0	175.0	0.0	∞
M 6981	1965.00	20.5	26.0	46.6	78.9	53.4	87.2
M 6984	2010.00	23.7	26.7	50.5	88.8	49.5	101.9
M 6987	2055.00	26.0	26.5	52.5	98.1	47.5	110.5
M 6989	2085.00	14.1	18.7	32.9	75.3	67.1	48.9
M 6991 sst	2173.00	42.1	31.6	73.7	133.3	26.3	280.(
M 6993	2201.00	18.2	24.1	42.3	75.4	57.7	73.3
M 6996	2246.00	12.4	24.5	36.9	50.7	63.1	58.4
M 7001	2321.00	15.4	17.1	32.5	90.5	67.5	48.2
M 7003 coal	2351.00	11.0	9.5	20.5	115.8	79.5	25.8
M 7005	2381.00	11.8	20.0	31.8	59.0	68.2	46.6

DATE : 10 - 11 - 82.

IKU

T A B L E 7.

TABULATION OF DATAS FROM THE GASCHROMATOGRAMS

IKU No.	DEPTH (m)	PRISTANE / n-C17	PRISTANE / PHYTANE	CPI
M 6909	885	0.6	3.4	1.0
M 6949	1485	0.7	2.9	1.4
M 6961	1665	1.3	5.6	1.4
M 6973	1845	0.6	1.4	1.2
M 6979	1935	0.7	1.5	0.7
M 6980 1st	1950	0.4	0.8	1.0
M 6981	1965	2.2	3.7	1.3
M 6984	2010	2.8	3.0	1.5
M 6987	2055	2.6	2.6	1.3
M 6989	2085	2.5	2.9	1.3
M 6991 sst	2173	0.6	1.3	1.0
M 6993	2201	0.7	2.6	1.2
M 6996	2246	0.7	2.7	1.2
M 7001	2321	1.1	3.0	1.2
M 7003 coal	2351	1.0	4.9	1.2
M 7005	2381	1.3	3.0	1.3

DATE : 9 - 11 - 82.

IKU

VITRINITE REFLECTANCE MEASUREMENTS

TABLE NO.: 8a

WELL NO. 7120/8-2

Sample	Depth	Vitrinite reflectance	Fluorescence in UV light	Exinite content
M-6909	870 - 885	0.39 (1)	Yellow/orange spores	Trace
M-6917	990 - 1005	0.43 (4)	Green/yellow spores and green carbonate minerals	Trace
M-6929	1170 - 1185	0.44 (1)	Green/yellow and yellow spores	Low
M-6937	1290 - 1305	0.44 (9)	Yellow and yellow/orange spores	Low - moderate
M-6945	1410 - 1425	0.44 (3)	Yellow and yellow/orange spores	Low
M-6953	1530 - 1545	0.50 (1)	Yellow/orange and low orange spores. Green dinoflagellates?	Low
M-6961	1650 - 1665	0.47 (10)	Low-orange spores	Trace
M-6965	1710 - 1725	0.48 (14)	Low-orange spores	Low
M-6973	1830 - 1845	0.51 (11)	Low-orange spores	Low to moderate
M-6979	1920 - 1935	0.48 (20)	Low-orange spores	Trace
M-6981	1950 - 1965	0.49 (20)	Mid-orange spores	Moderate
M-6984	1995 - 2010	0.46 (21)	Mid-orange spores	Moderate

IKU

VITRINITE REFLECTANCE MEASUREMENTS

TABLE NO.: 8a

WELL NO. 7120/8-2

Sample	Depth	Vitrinite reflectance	Fluorescence in UV light	Exinite content
M-6987	2040 - 2055	0.47 (20)	Low-orange spores	Moderate
M-6989	2070 - 2085	0.52 (19)	Low-orange and mid-orange spores	Moderate
M-6990	2085 - 2138	0.52 (20)	Low-orange spores and mid-orange unidentified fragments	Low - Moderate
M-6993	2186 - 2201	0.52 (19)	Low-orange spores	Trace
M-6996	2231 - 2246	0.58 (21)	Mid-orange spores	High
M-7001	2306 - 2321	0.52 (20)	Low-orange and mid-orange spores	Moderate
M-7003	2336 - 2351	0.67 (24)	Mid orange spors and yellow resins	Low
M-7005	2366 - 2381	0.48 (20)	Mid-orange spores and algae	Low - Moderate
M-7010	2441 - 2456	0.53 (14)	Low-orange and mid-orange spores and green/yellow resin	Moderate

IKU

Visual Kerogen Analysis

TABLE NO.: 8b
WELL NO.: 7120/8-2

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
M-6909	885	Am, Cy/W	F	fair to good	1+/2-	Pyritic, often small and rounded aggregates of amorphous material embedding palynomorphs and small vitrinite particles. Some flaky structures.
M-6929	1185	*W, WR!/Am, Cy	F	good	1+	*Pyritic small residue. Odontochitina in a rich cyst assemblage. Pollen very rare.
M-6945	1425	W, WR!, P/Am, Cy	F-M	good	1+/2-	Pyritic residue. Fairly large semifusinite fragments.
M-6953	1545	W, WR!, P, S, Cut/Am, Cy	F(-M)	good	1/1+	Pyritic residue with semifusinite/fusinite, inertinite and etched vitrinite.
M-6961	1665	W, WR!, P, S, /Am, Cy	F(-M)	good	1/1+, 1+	
M-6973	1845	W, WR!, P, Cut/Am, Cy	F-M	fair to good	1+/2-	Mainly as 1545m and 1665m.

ABBREVATIONS

Am	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
He	Herbaceous	P	Pollen grains	C	Coal	M	Medium
Cut	Cuticles	S	Spores	R!	Reworked	L	Large

IKU

Visual Kerogen Analysis

TABLE NO.: 8b
WELL NO.: 7120/8-2

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
M-6979	1935	W, WR!, Cut, P/Am, Cy	F-M(-L)	fair to poor	-2/2	Aggregates with amorphous matrix embedding small vitrinite particles, semifusinite, etched vitrinite fragments and sapropelised strongly degraded cuticles.
M-6981	1965	W, WR!, Cut, P/Am, Cy	F-M(-L)	fair to poor	-2/2	Dense aggregates, Jurassic/ Cretaceous cysts darkly stained. Resemblance with 1935m.
M-6984	2010	Cut, W, P/Am,	F-M-L	fair	1+/2-, 2-/2	Highly pyritic but less degraded material. Chasmatosporites.
M-6987	2055	Cut, W, P/Am	F-M-L	poor	1+/2-, 2-/2	Very dense aggregates evaluated as composed mainly of cuticular strongly degraded material. True amorphous material was difficult to distinguish.

ABBREVATIONS

Am	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
He	Herbaceous	P	Pollen grains	C	Coal	M	Medium
Cut	Cuticles	S	Spores	R!	Reworked	L	Large

049/r/ah/2

KU

Visual Kerogen Analysis

TABLE NO.: 8b
WELL NO.: 7120/8-2

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
M-6989	2085	Cut, W, P/?Am	F-M	poor	1+/2-, 2-/2	Dense amorphous aggregates believed to consist mainly of strongly degraded cuticles and wood embedding other fossils.
M-6993	2201	Cut, W, WR!, P/Am, Cy	F-M-	poor	1+/2-, 2-/2	Odontochitina and semifusinite together with remains resembling 2085m and 2055m.
M-6996	2246	W, Cut, P/Am	F-M-L	fair	2-/2	Botryococcus.
M-7001	2321	Cut, W, P/Am	F-M-L	fair to good	2-/2	Dense aggregates rich in pyrite framboids.
M-7005	2381	W, Cut, WR!, P/Am	F-M-L	fair	2-/2	Vitrinite , inertinite and semifusinite/fusinite. Odontochitina and other Cretaceous cysts, bisaccates and triporates.

BBREVATIONS

m	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
e	Herbaceous	P	Pollen grains	C	Coal	M	Medium
ut	Cuticles	S	Spores	R!	Reworked	L	Large

IKU

TABLE 9.

ROCK EVAL PYROLYSES

IKU No.	DEPTH m/ft	S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1/(S1+S2)	TEMP MAX (C
M 6897	720	0.22	0.26	0.60	0.90	29	67	0.48	0.46	42
M 6909	885	0.85	1.73	1.25	1.17	148	107	2.58	0.33	34
M 6913	945	1.08	2.08	1.09	1.03	202	106	3.16	0.34	35
		Clst	gy - sn - gy							
M 6917	1005	0.42	0.74	0.60	0.84	88	71	1.16	0.36	36
M 6937	1305	0.16	0.35	0.51	1.02	34	50	0.51	0.31	42
M 6941	1365	0.13	0.26	3.96	0.89	29	445	0.39	0.33	43
M 6945	1425	0.24	0.33	1.47	1.09	30	135	0.57	0.42	43
M 6953	1545	0.16	0.28	0.66	1.12	25	59	0.44	0.36	45
M 6957	1605	0.16	0.14	0.54	1.17	12	46	0.30	0.53	36
		Clst	dk - gy							
M 6961	1665	0.18	0.39	0.76	1.56	25	49	0.57	0.32	43
		Clst	dk - gy							
M 6961	1665	0.31	0.37	7.45	1.03	36	723	0.68	0.46	46
		Ls								
M 6965	1725	0.51	1.34	2.11	2.18	61	97	1.85	0.28	43
		Clst	dk - gy							
M 6965	1725	0.41	0.63	8.49	1.59	40	534	1.04	0.39	44
		Ls								
M 6973	1845	0.30	1.63	4.77	2.28	71	209	1.93	0.16	38
		Clst	dk - gy							
M 6973	1845	0.23	1.44	4.77	0.96	150	497	1.67	0.14	43
		Ls								
M 6977	1905	0.10	0.35	0.79	1.74	20	45	0.45	0.22	44
M 6978	1920	0.17	0.39	0.63	1.47	27	43	0.56	0.30	43
M 6979	1935	0.11	0.75	0.92	2.56	29	36	0.86	0.13	44
M 6980	1950	0.13	0.51	0.90	1.67	31	54	0.64	0.20	44
M 6981	1965	0.45	2.06	1.05	2.29	90	46	2.51	0.18	43
M 6982	1980	0.24	1.69	0.77	2.18	78	35	1.93	0.12	43
M 6983	1995	0.58	4.87	0.67	3.41	143	20	5.45	0.11	43
M 6984	2010	1.37	11.87	0.32	4.08	291	8	13.24	0.10	43

IKU

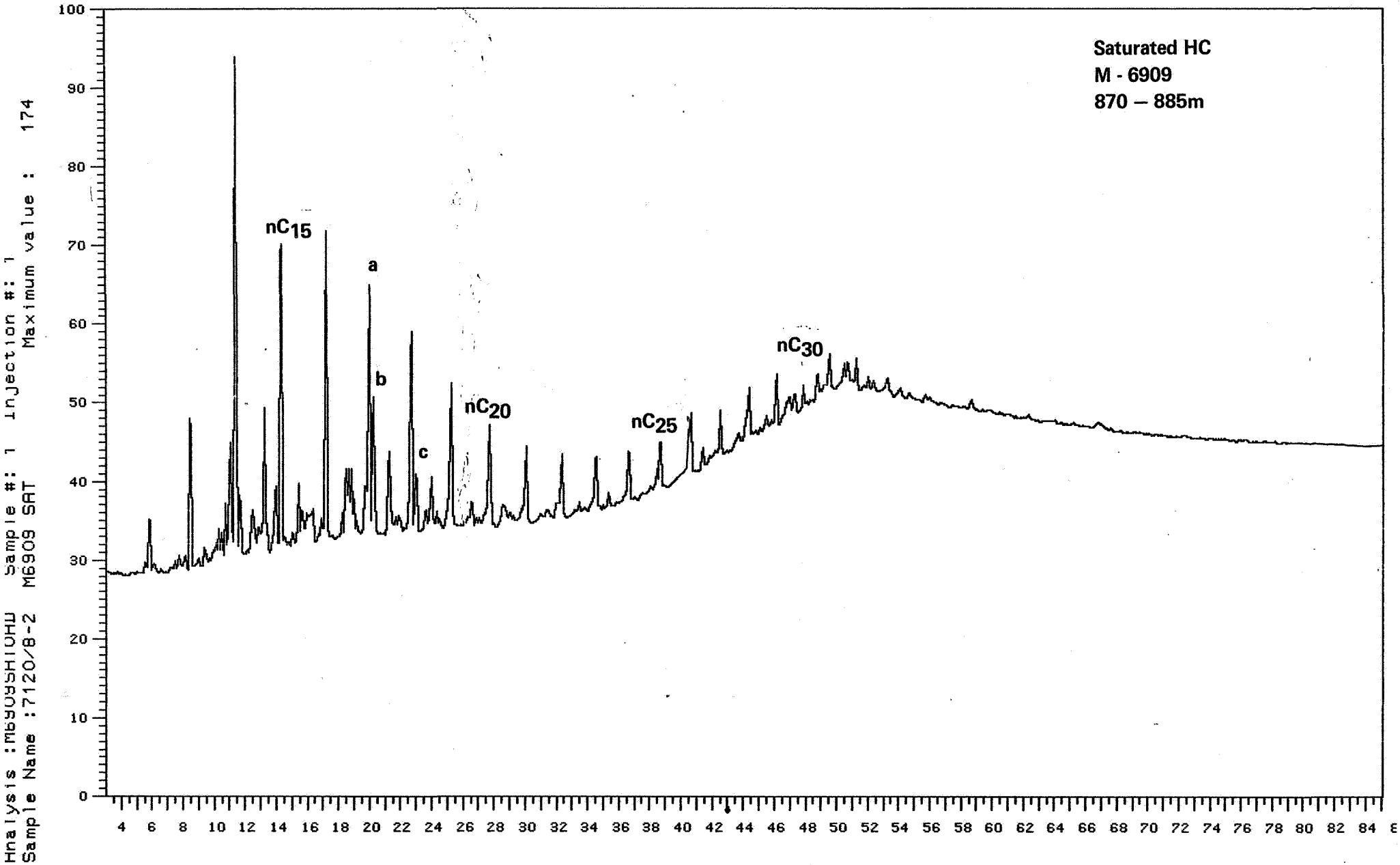
TABLE 9.

R O C K E V A L P Y R O L Y S E S

IKU No.	DEPTH m/ft	S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1/(S1+S2)	TEMP MAX (C)
M 6985	2025	1.38	12.85	0.32	4.28	300	7	14.23	0.10	431
M 6986	2040	1.83	14.06	0.44	4.84	290	9	15.89	0.12	432
M 6987	2055	3.09	19.25	0.57	7.92	243	7	22.34	0.14	432
M 6988	2070	3.22	21.23	0.69	9.62	221	7	24.45	0.13	431
M 6989	2085	7.70	23.77	0.65	10.40	229	6	31.47	0.24	430
M 6990	2138	0.50	2.87	1.08	3.41	84	32	3.37	0.15	434
M 6991	2173	0.67	1.87	1.10	3.00	62	37	2.54	0.26	438
M 6992	2186	0.69	2.32	0.65	2.95	79	22	3.01	0.23	436
M 6993	2201	0.34	1.54	0.43	2.70	57	16	1.88	0.18	438
M 6994	2216	0.21 Clst	0.93 dk - sy	0.58	2.38	39	24	1.14	0.18	438
M 6995	2231	0.69	2.15	0.40	2.38	90	17	2.84	0.24	433
M 6996	2246	2.01	10.23	0.26	4.35	235	6	12.24	0.16	439
M 6998	2276	0.66	2.79	0.40	2.90	96	14	3.45	0.19	440
M 7001	2321	0.64	2.01	0.55	2.08	97	26	2.65	0.24	436
M 7002	2336	0.28	1.18	0.44	1.80	66	24	1.46	0.19	435
M 7003 COAL	2351	12.03	104.63	1.42	62.09	169	2	116.66	0.10	440
M 7004	2366	0.59	3.19	0.82	3.89	82	21	3.78	0.16	437
M 7005	2381	0.95	13.34	0.79	9.17	145	9	14.29	0.07	437
M 7010	2456	1.59	9.09	0.81	7.42	123	11	10.68	0.15	441
M 7013	2501	0.41	1.25	1.25	2.05	61	61	1.66	0.25	440

DATE : 8 - 11 - 82.

GAS CHROMATOGRAMS OF
SATURATED FRACTION


Saturated HC
M - 6909
870 – 885m
nC15
a
b
c
nC20
nC25
nC30
Analysis :M6909SHIOHW Sample #: 1 Injection #: 1
Sample Name :7120/8-2 M6909 SAT Maximum value : 174
100
90
80
70
60
50
40
30
20
10
0
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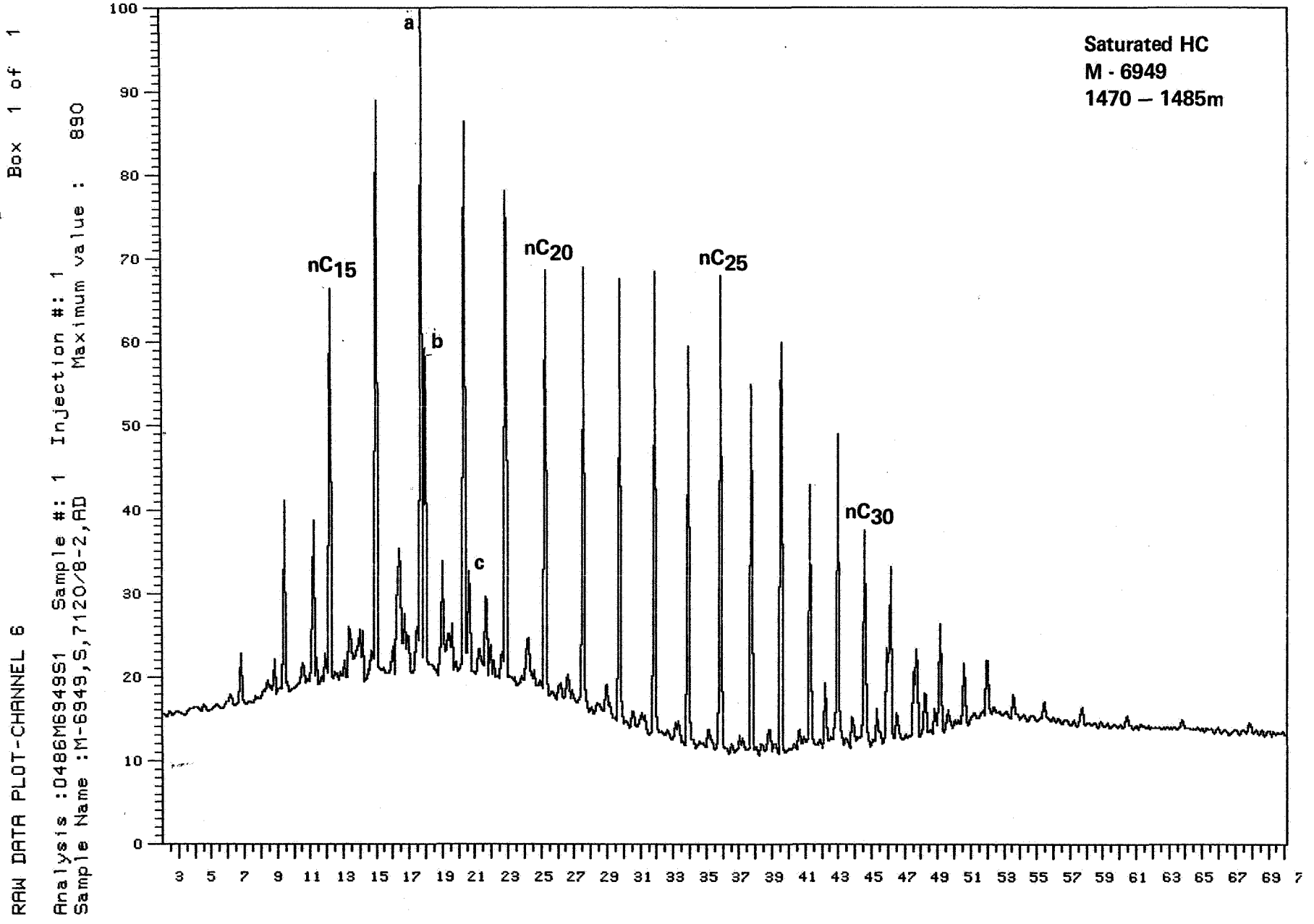
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Box 1 of 1
Analysis :0486M6949S1 Sample #: 1 Injection #: 1
Sample Name :M-6949,S,7120/8-2,AD Maximum value : 890
Saturated HC
M - 6949
1470 – 1485m
a
b
c
nC15
nC20
nC25
nC30
100
90
80
70
60
50
40
30
20
10
0
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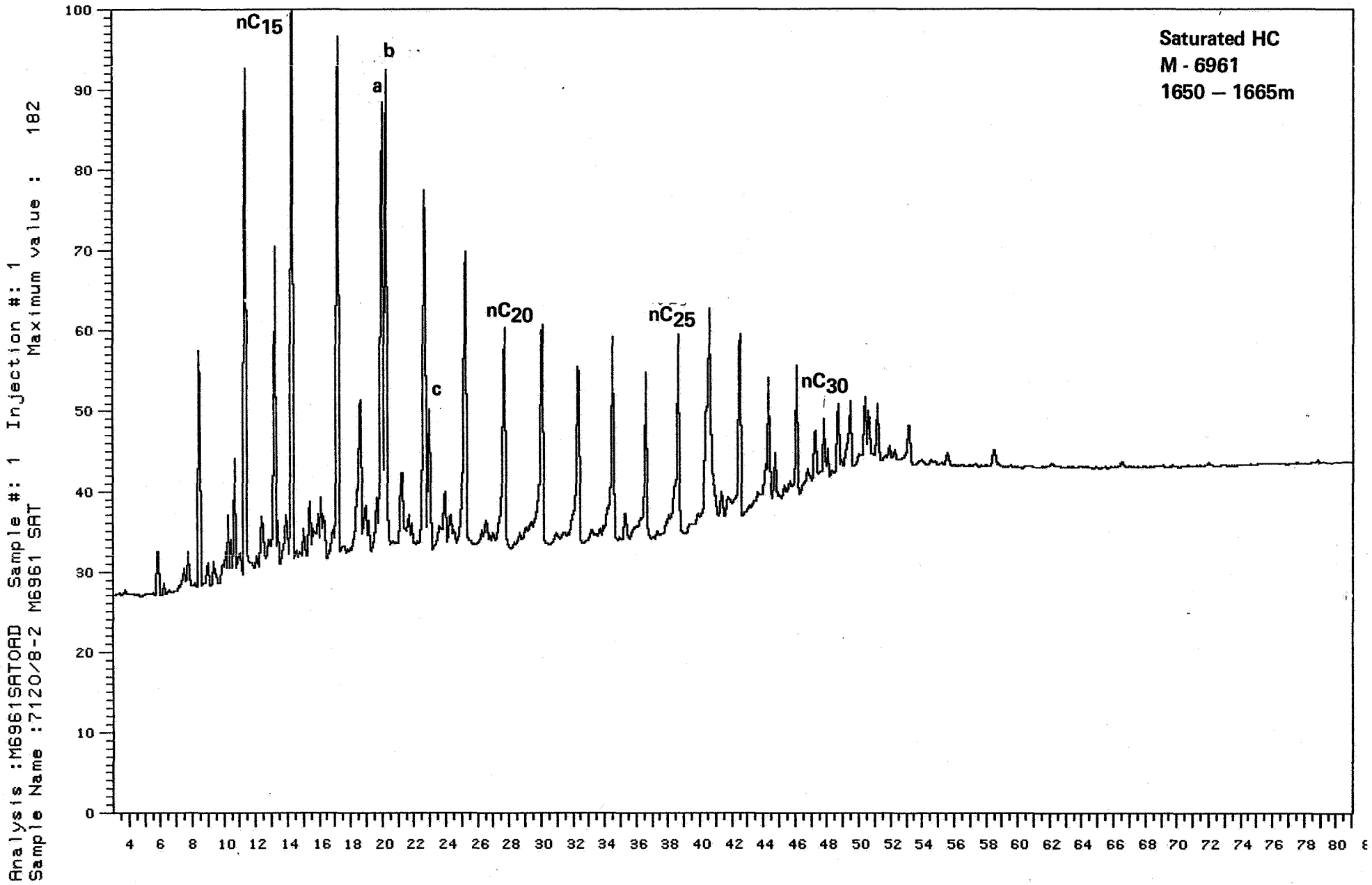
Saturated HC
M - 6961
1650 – 1665m
nC15
nC20
nC25
nC30
a
b
c
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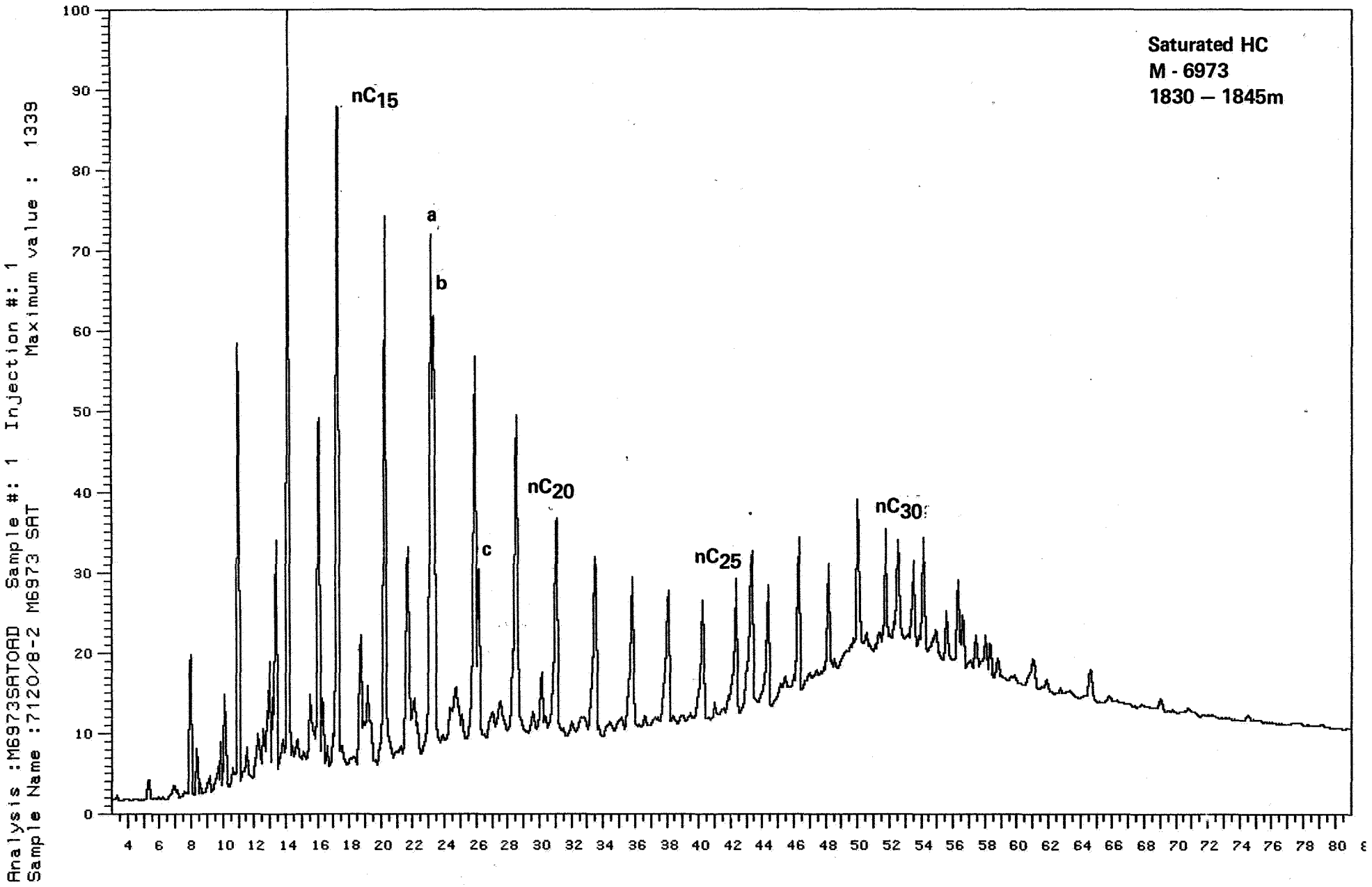
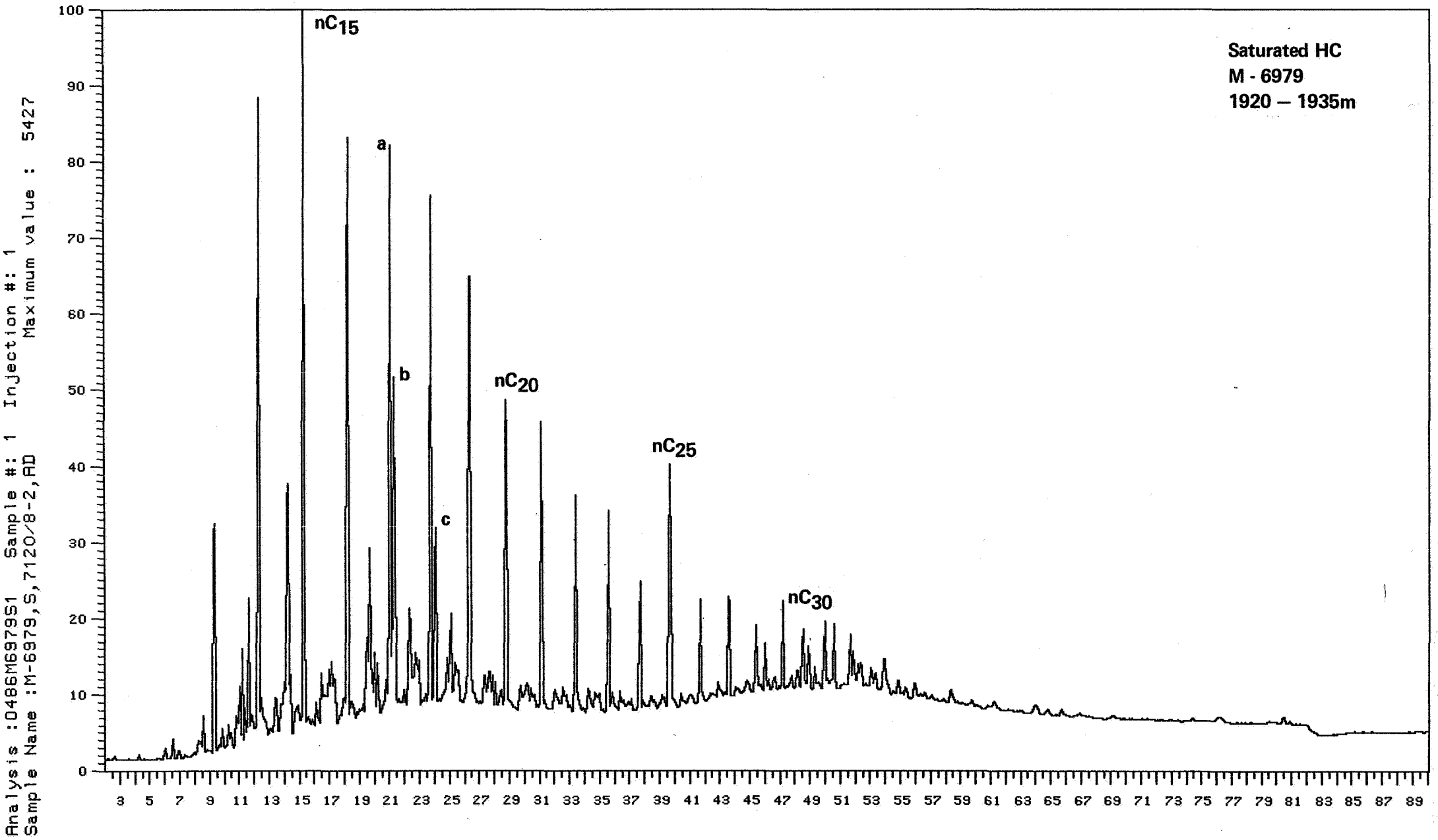
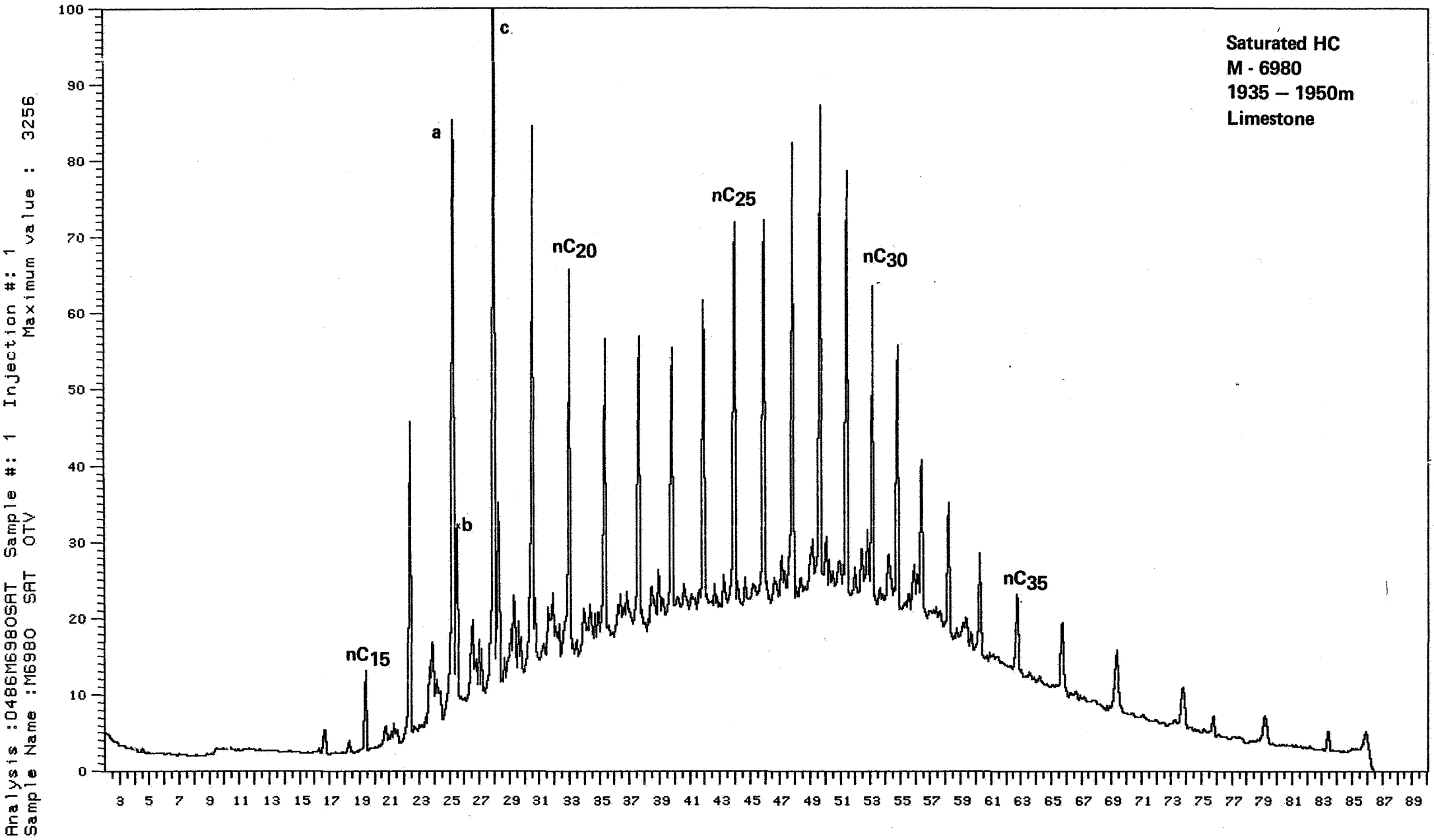
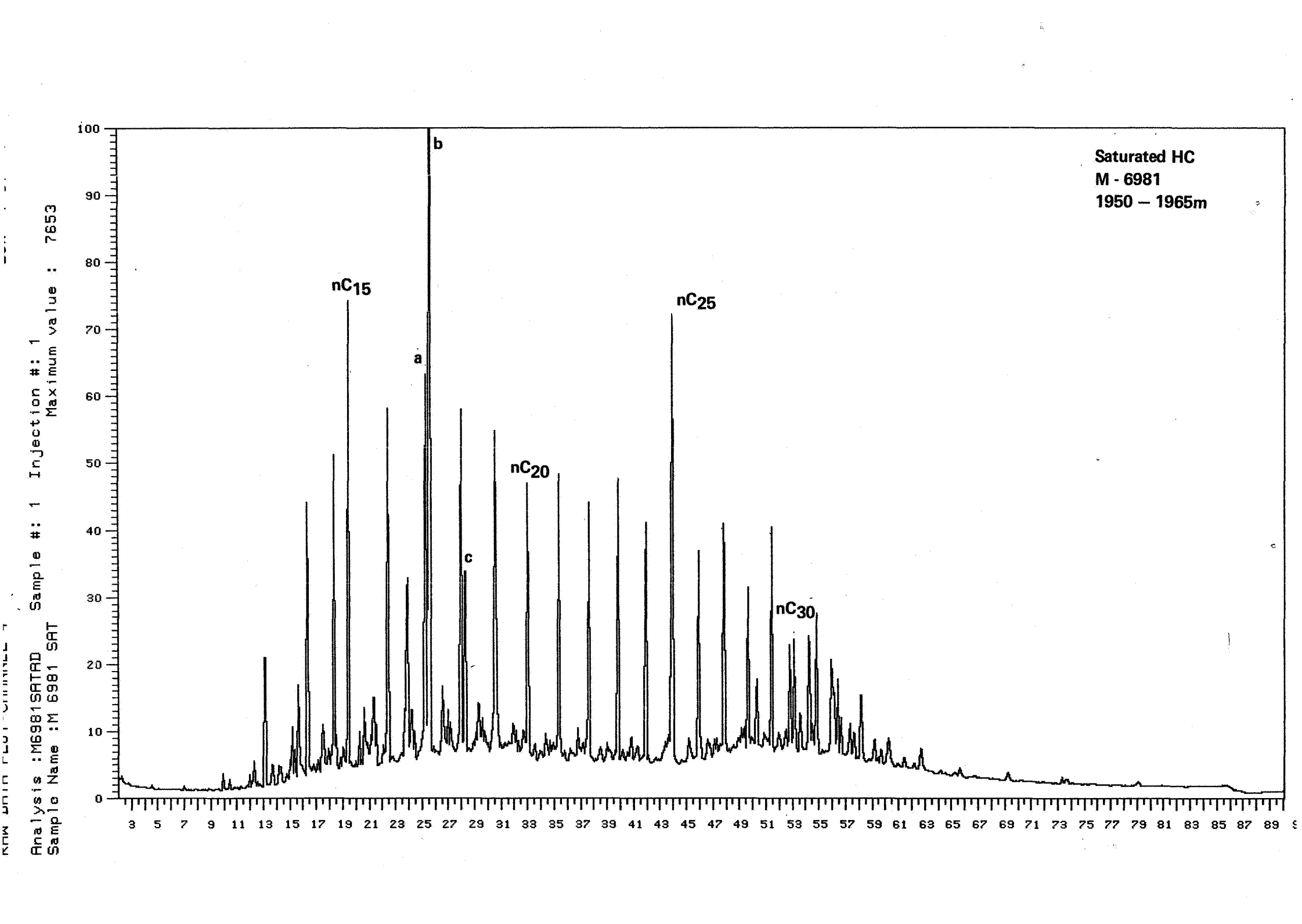
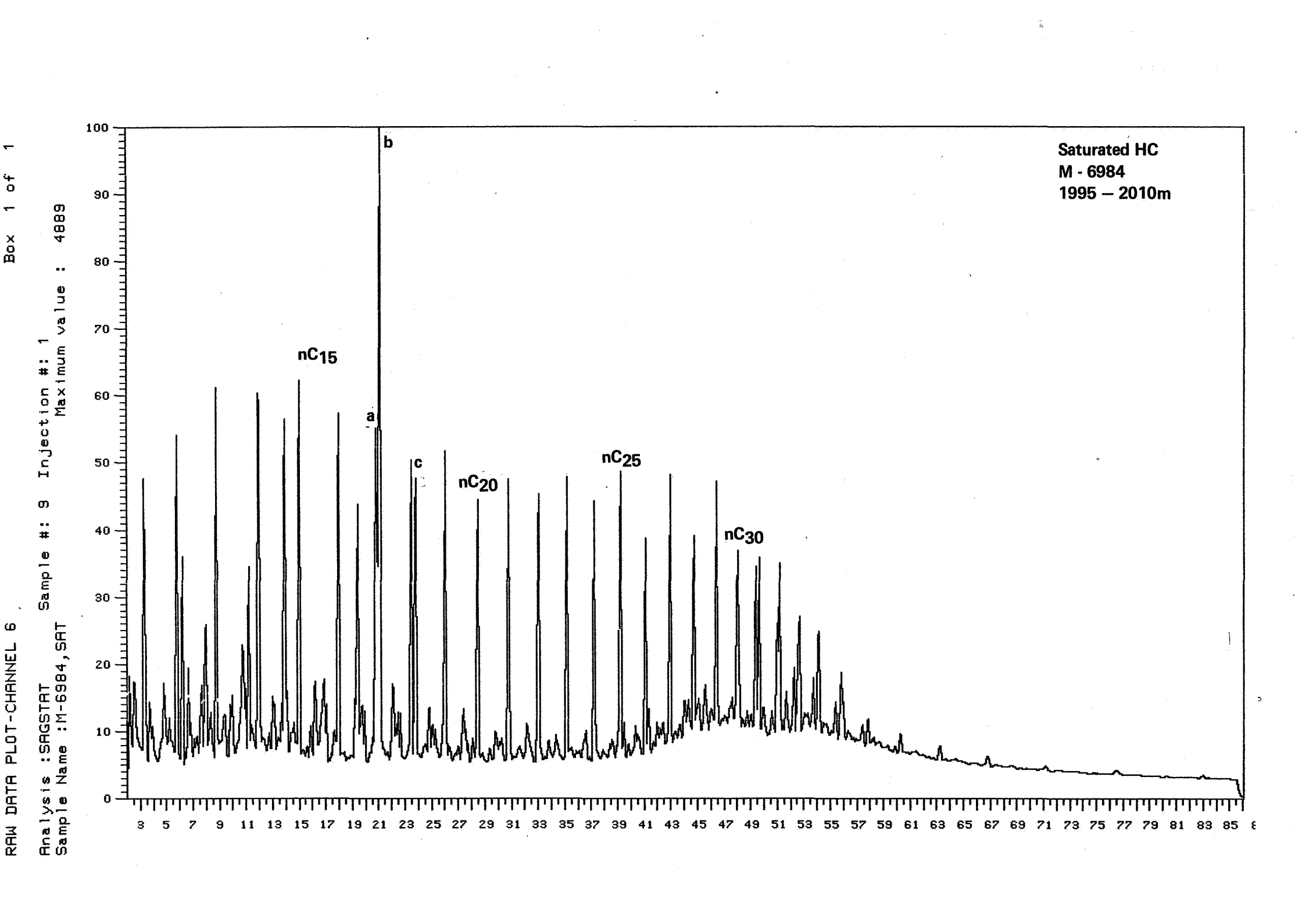
Sample Name :7120/8-2 M6961 SAT Maximum value : 182


Saturated HC
M - 6973
1830 – 1845m
nC15
a
b
c
nC20
nC25
nC30
Analysis :M6973SATOAD Sample #: 1 Injection #: 1
Sample Name :7120/8-2 M6973 SAT Maximum value : 1339


Saturated HC
M - 6979
1920 – 1935m
nC15
a
b
c
nC20
nC25
nC30
Analysis :0486M6979S1 Sample #: 1 Injection #: 1
Sample Name :M-6979,S,7120/8-2,AD Maximum value : 5427
100
90
80
70
60
50
40
30
20
10
0
3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89


Saturated HC
M - 6980
1935 – 1950m
Limestone
a
b
c
nC15
nC20
nC25
nC30
nC35
Analysis :0486M6980SAT Sample #: 1 Injection #: 1
Sample Name :M6980 SAT OTV
Maximum value : 3256


Saturated HC
M - 6981
1950 – 1965m
nC15
nC20
nC25
nC30
a
b
c
Analysis :M6981SATRD Sample #: 1 Injection #: 1
Sample Name :M 6981 SAT
Maximum value : 7653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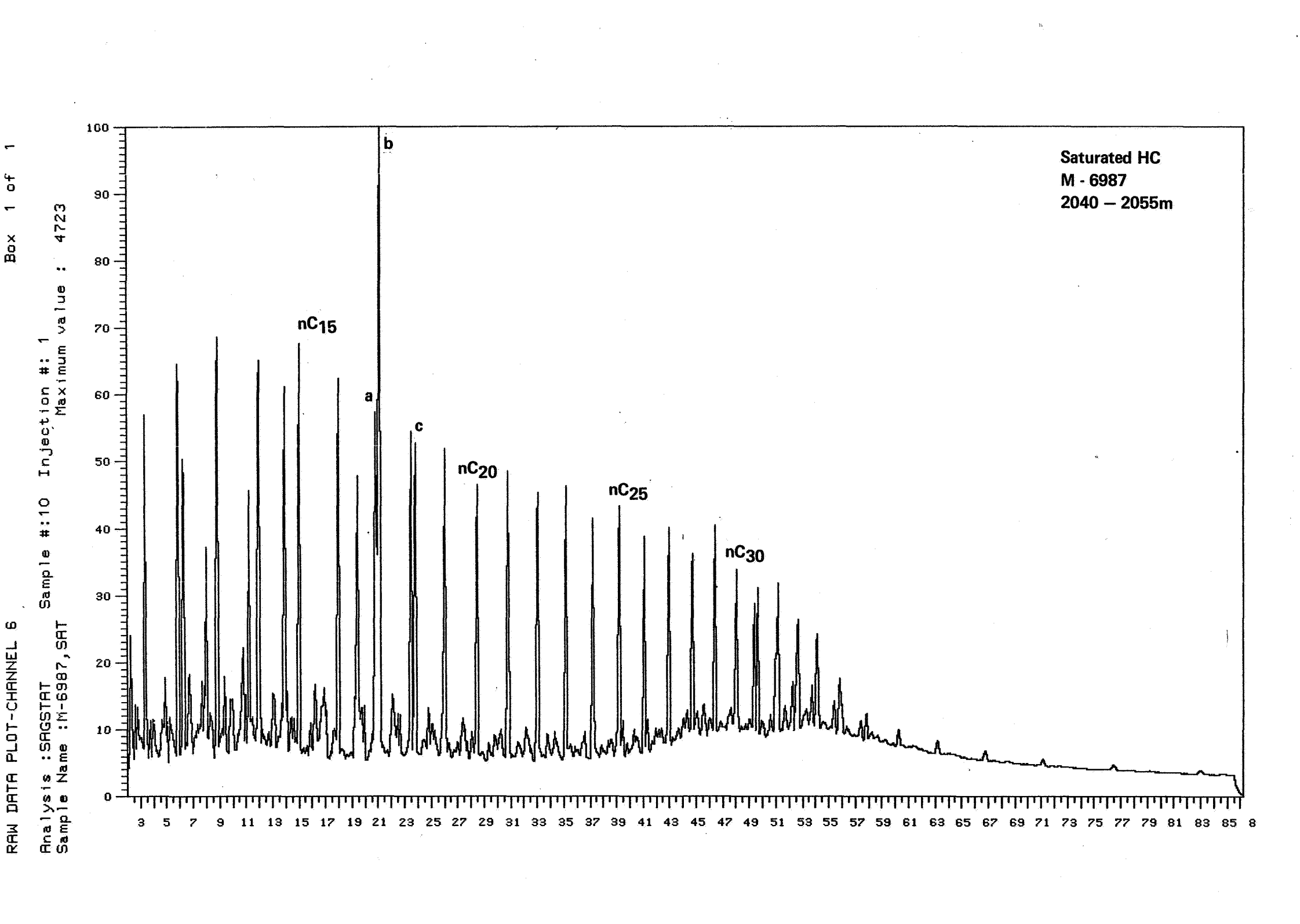
Analysis :SAGSTAT Sample #: 9 Injection #: 1
Sample Name :M-6984,SAT Maximum value : 4889
Saturated HC
M - 6984
1995 – 2010m
nC15
nC20
nC25
nC30
a
b
c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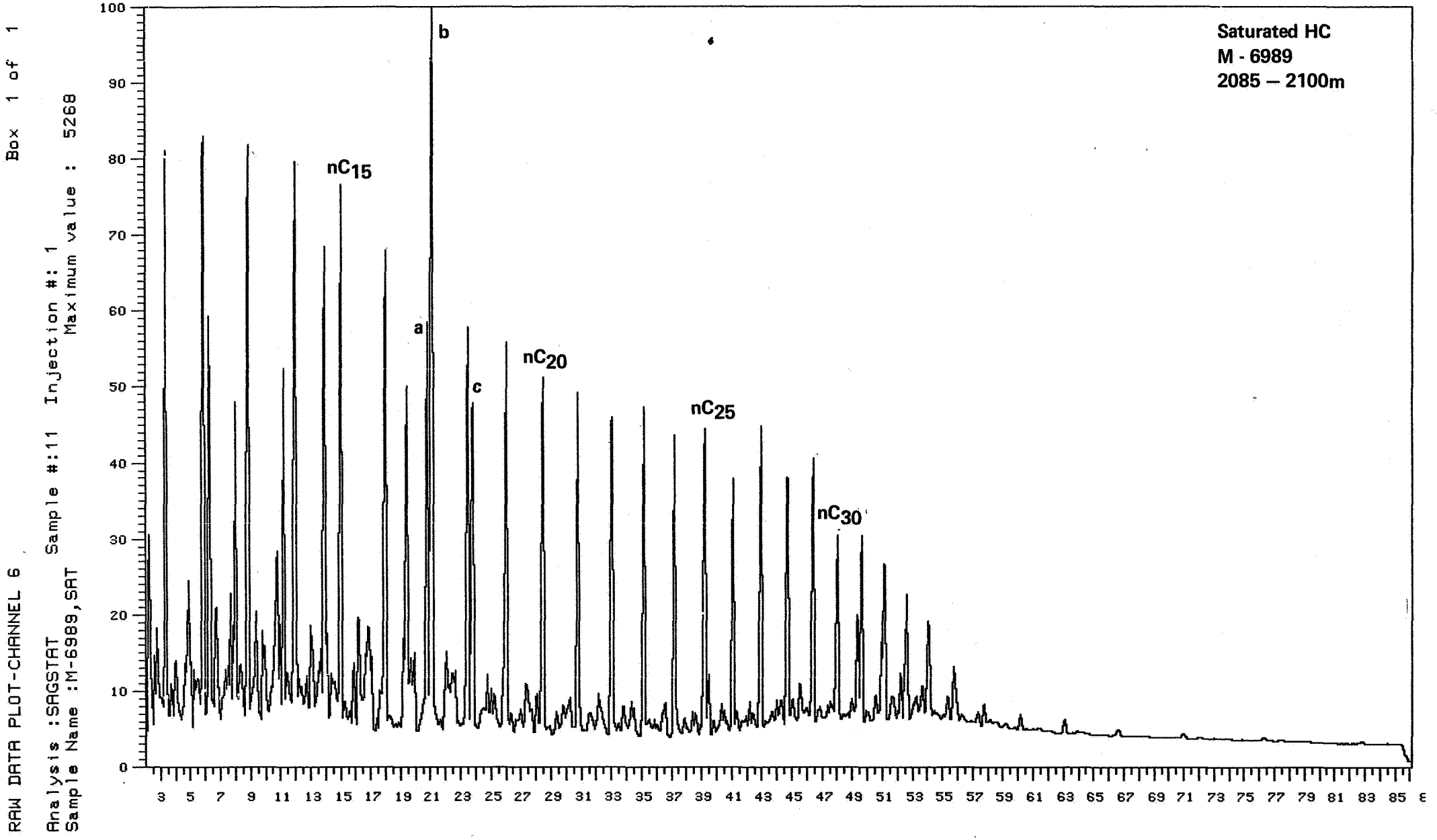
Box 1 of 1
Analysis :SAGSTAT Sample #:10 Injection #: 1
Sample Name :M-6987,SAT Maximum value : 4723
Saturated HC
M - 6987
2040 – 2055m
nC15
nC20
nC25
nC30
a
b
c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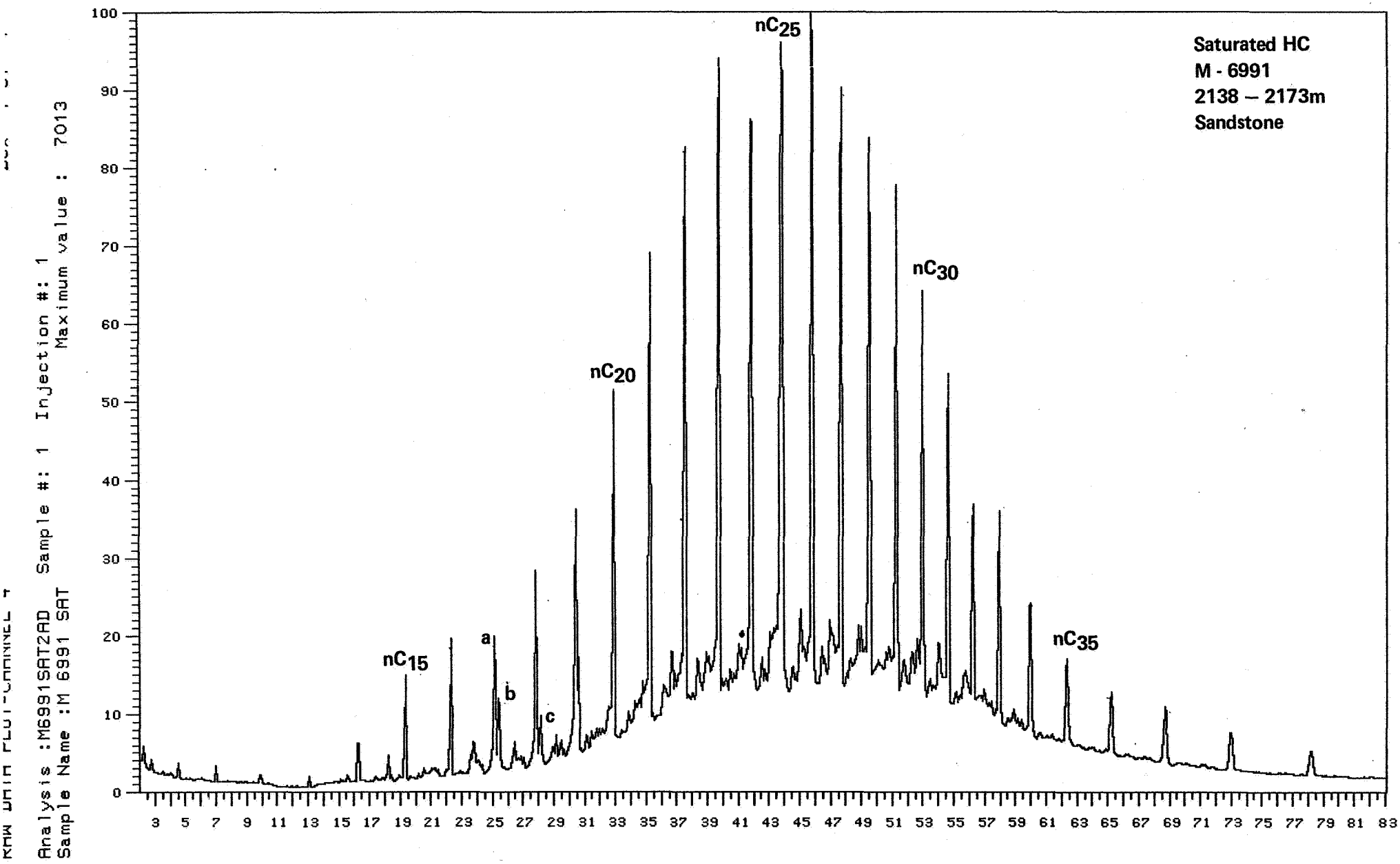
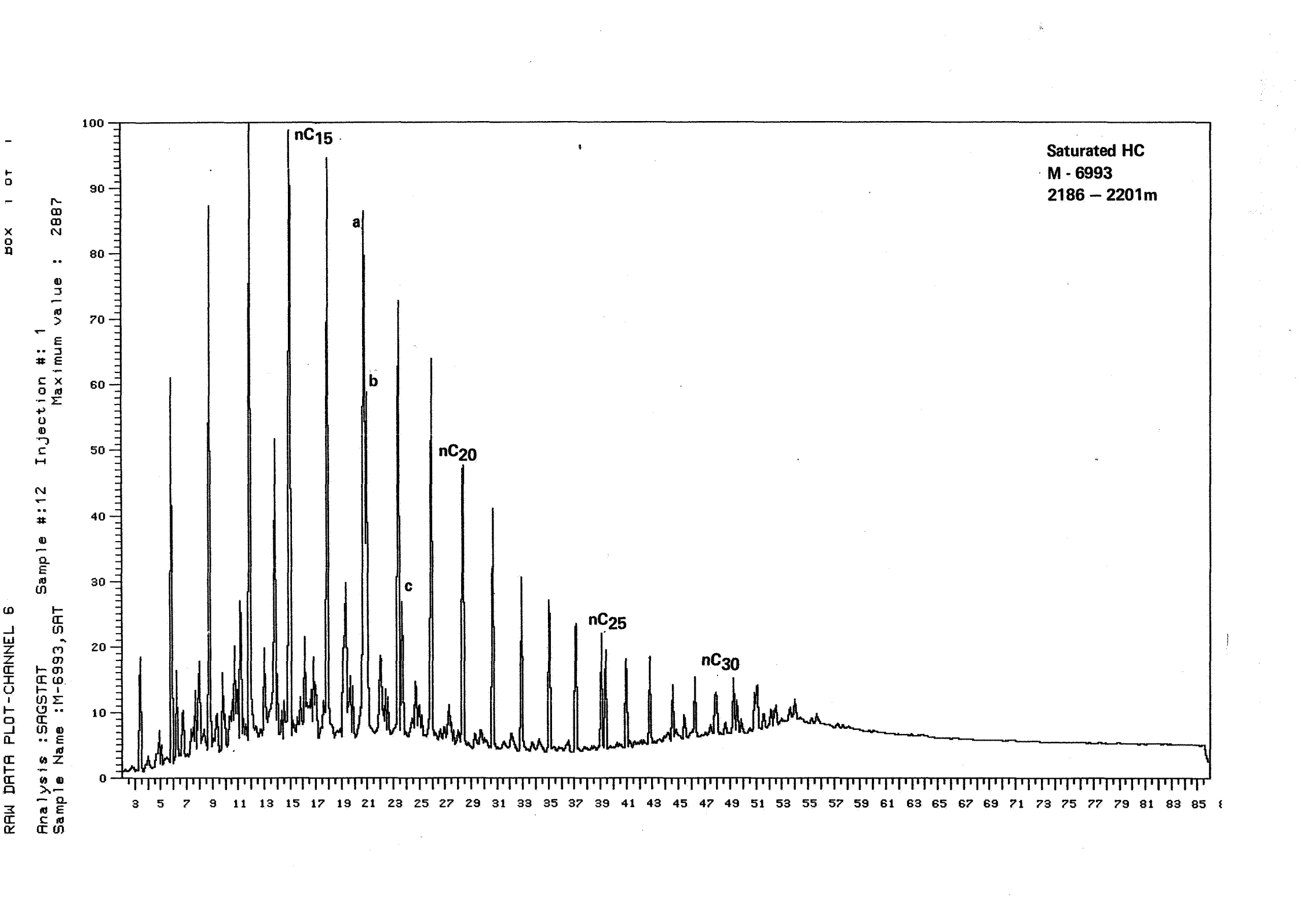
Box 1 of 1
Analysis :SAGSTAT
Sample Name :M-6989,SAT
Sample #:11 Injection #: 1
Maximum value : 5268
Saturated HC
M - 6989
2085 – 2100m
nC15
nC20
nC25
nC30
a
b
c


Saturated HC
M - 6991
2138 – 2173m
Sandstone
nC15
nC20
nC25
nC30
nC35
a
b
c
Analysis :M6991SAT2AD Sample #: 1 Injection #: 1
Sample Name :M 6991 SAT
Maximum value : 7013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Sample #:12 Injection #: 1
Maximum value : 2887
Saturated HC
M - 6993
2186 – 2201m
nC15
a
b
c
nC20
nC25
nC30
100
90
80
70
60
50
40
30
20
10
0
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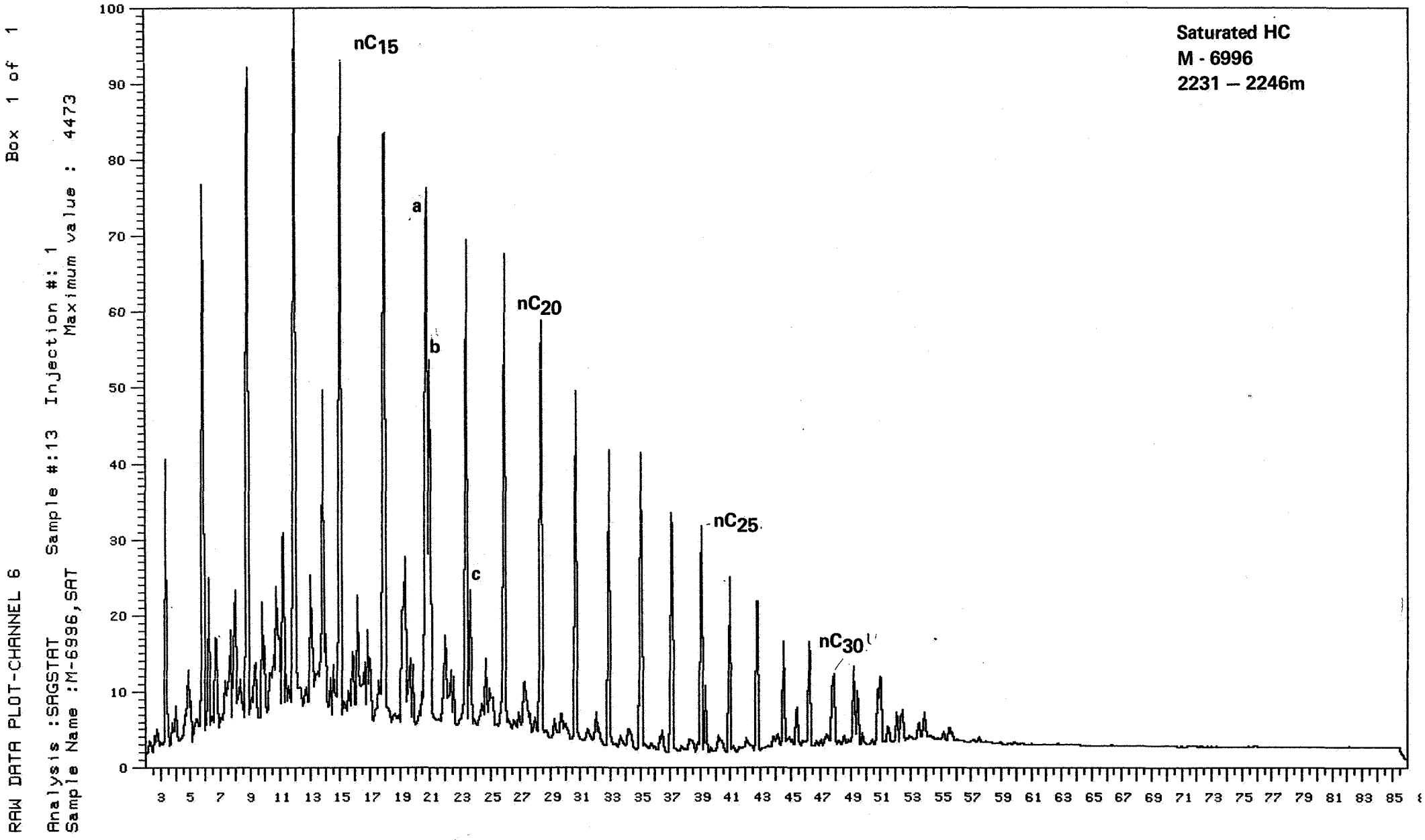
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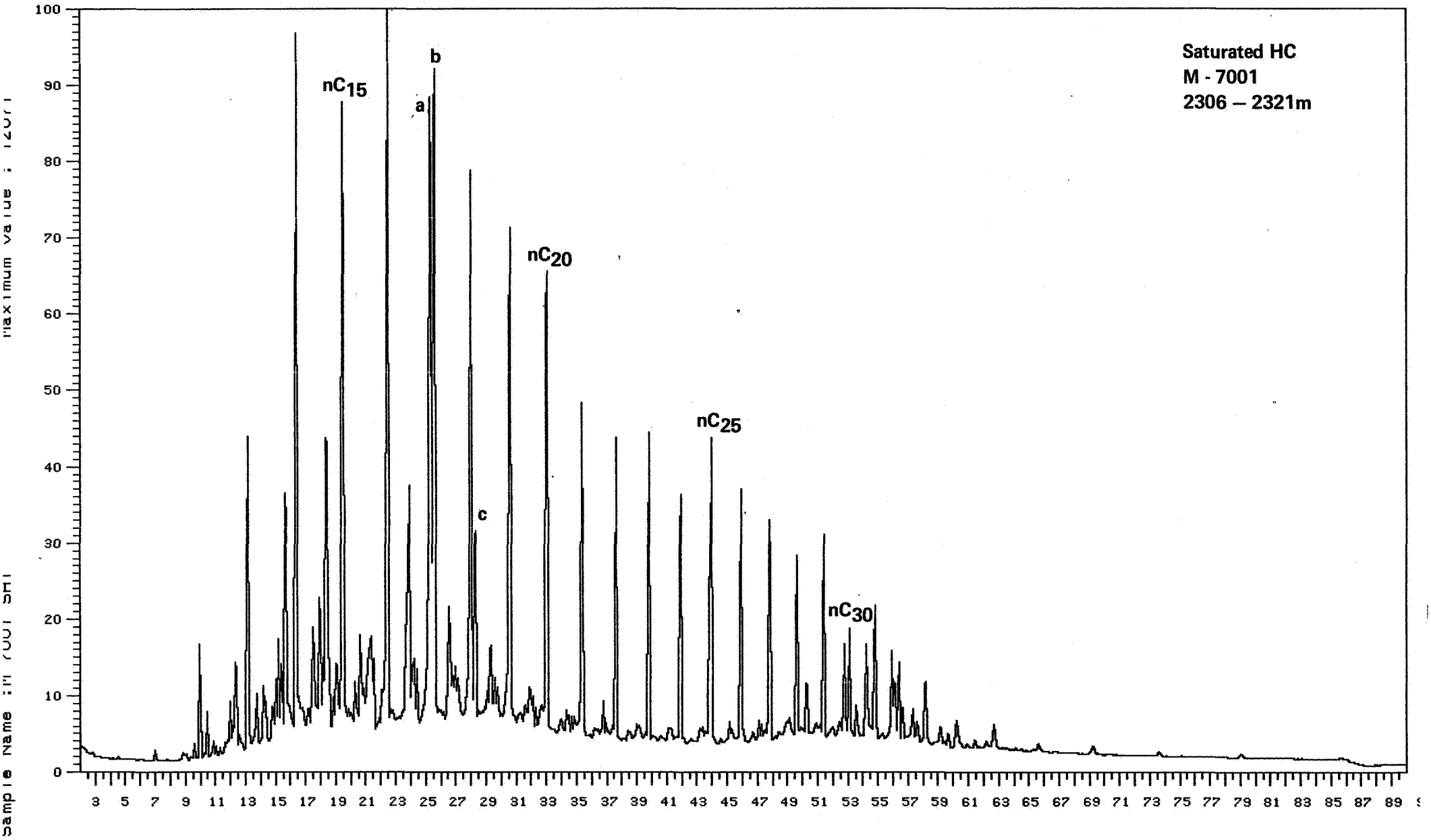
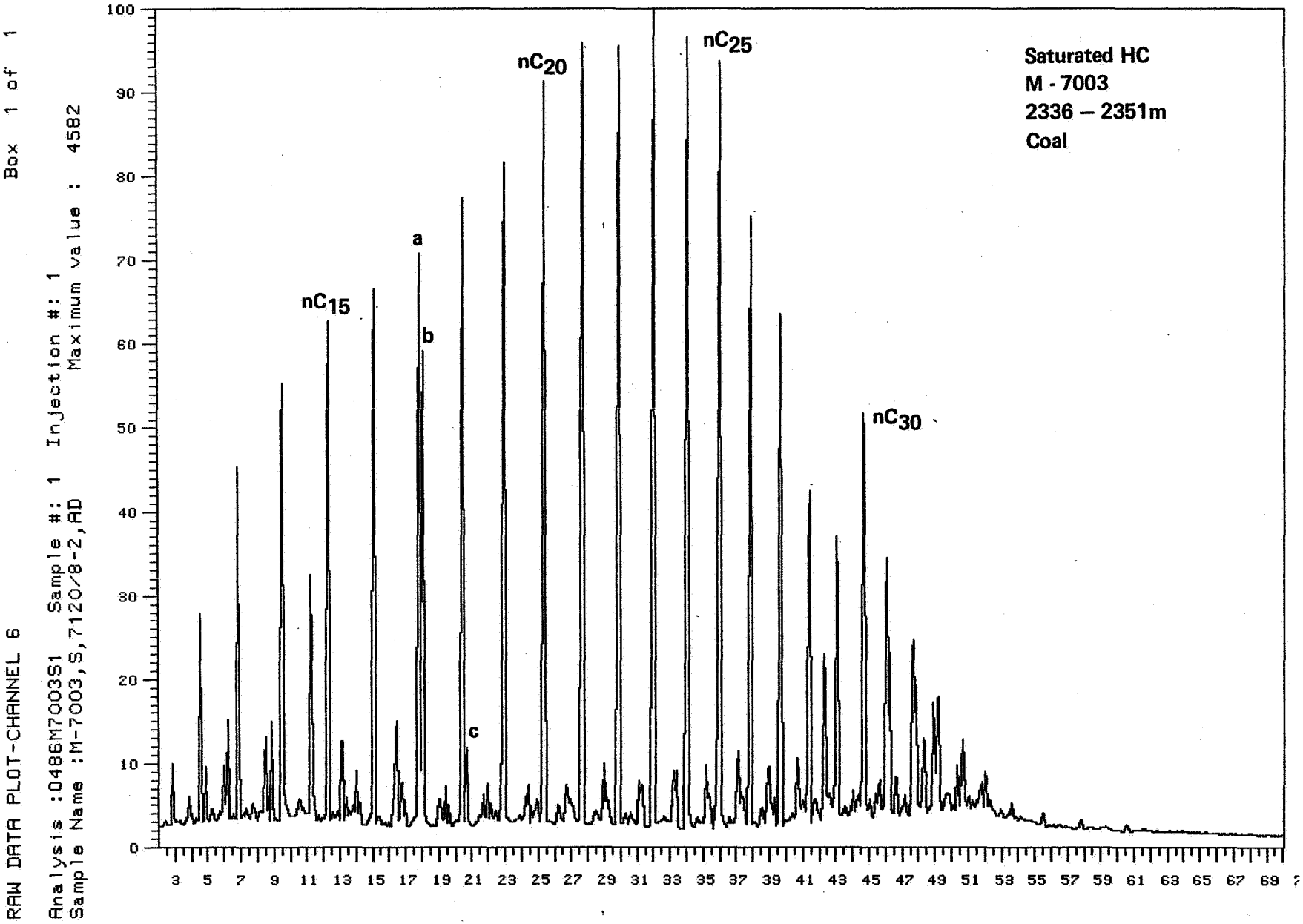
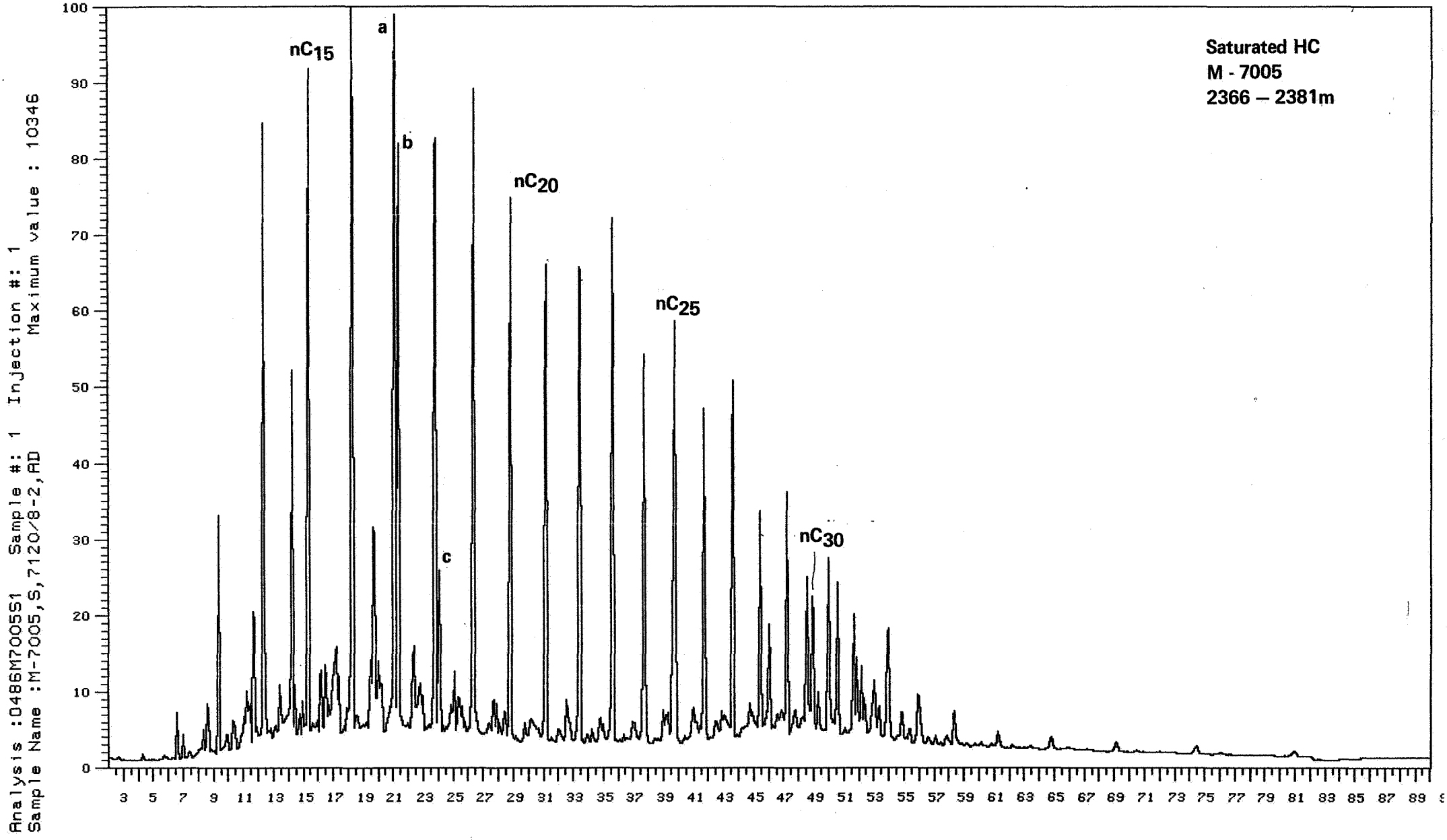
Box 1 of 1
Analysis :SAGSTAT Sample #:13 Injection #: 1
Sample Name :M-6996,SAT Maximum value : 4473
Saturated HC
M - 6996
2231 – 2246m
nC15
nC20
nC25
nC30
a
b
c

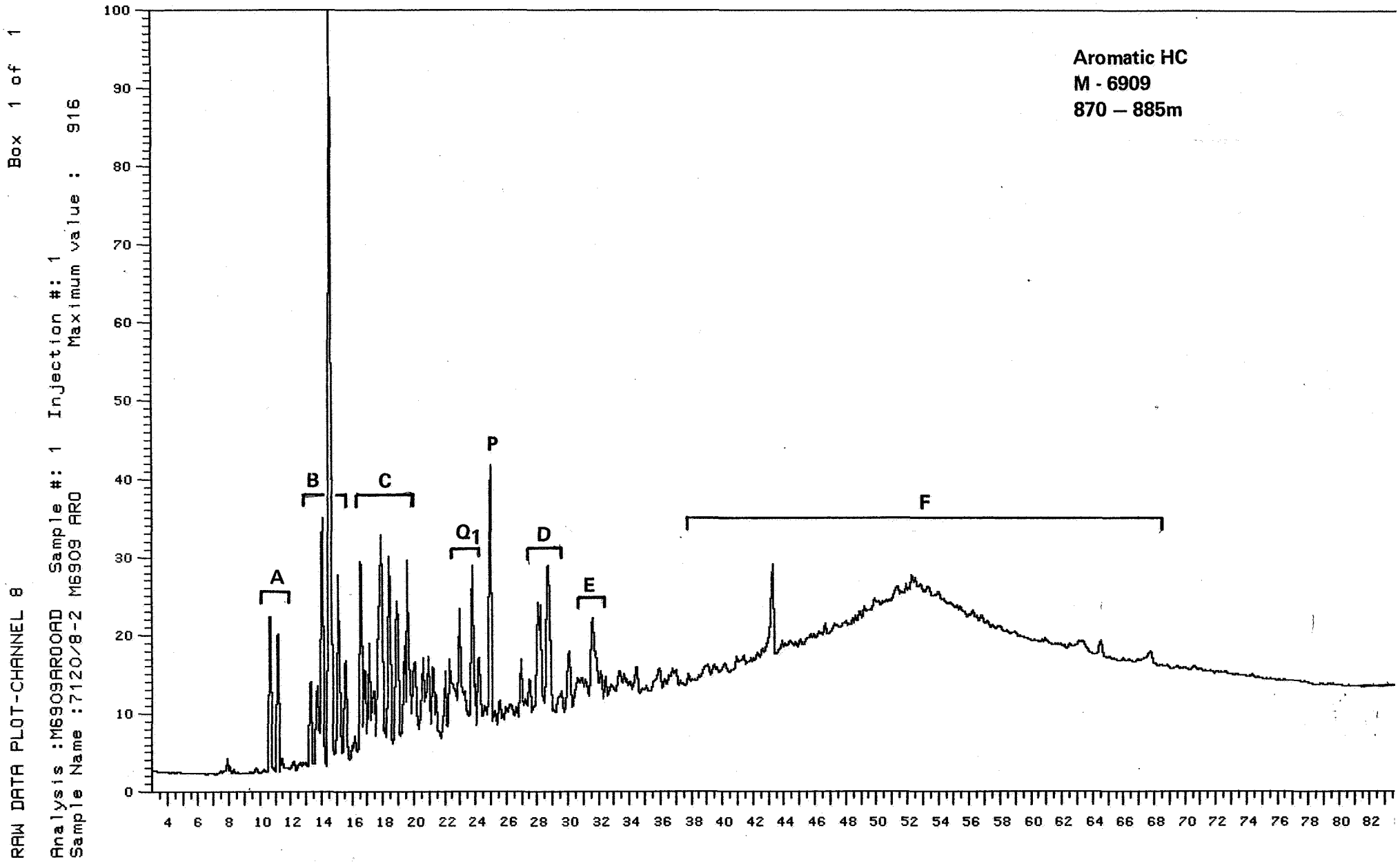

Saturated HC
M - 7001
2306 – 2321m
nC15
a
b
c
nC20
nC25
nC30
Maximum value : 12071
Sample Name : M 7001 SHI

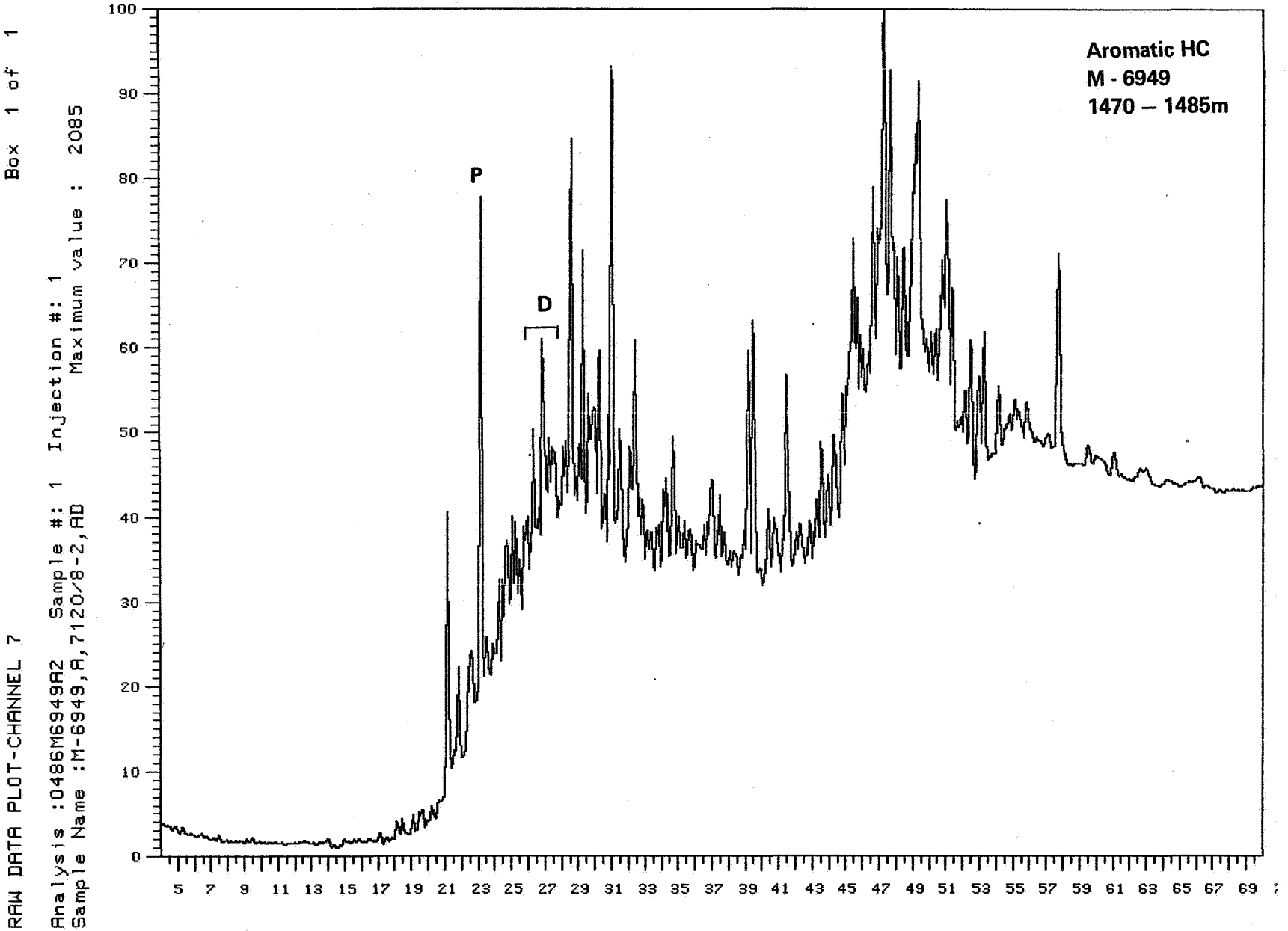

RAW DATA PLOT-CHANNEL 6
Box 1 of 1
Analysis :0486M7003S1 Sample #: 1 Injection #: 1
Sample Name :M-7003,S,7120/8-2,AD Maximum value : 4582
nC15
a
b
c
nC20
nC25
nC30
Saturated HC
M - 7003
2336 – 2351m
Coal

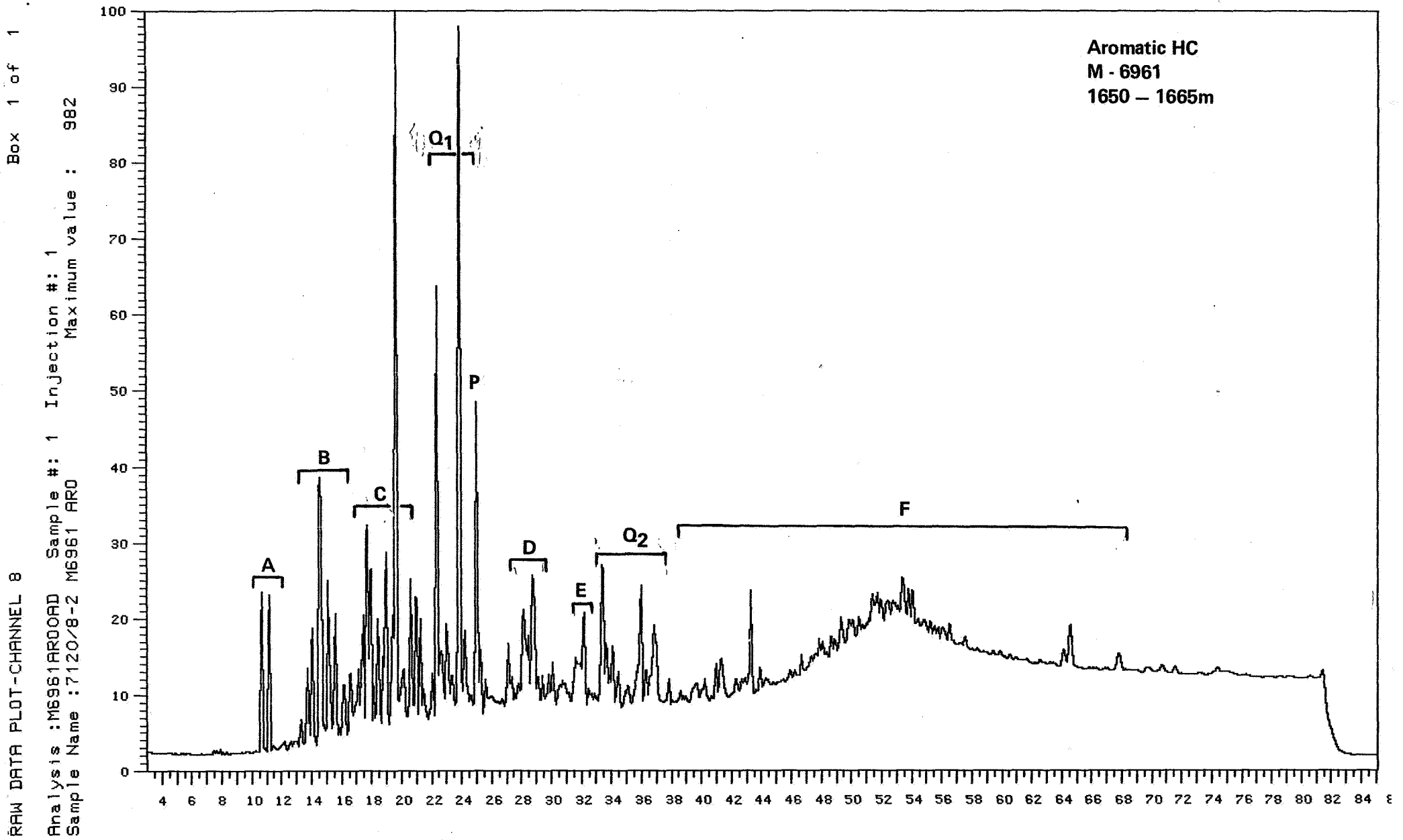

Saturated HC
M - 7005
2366 – 2381m
nC15
nC20
nC25
nC30
a
b
c
Analysis :0486M7005S1 Sample #: 1 Injection #: 1
Sample Name :M-7005,S,7120/8-2,AD Maximum value : 10346

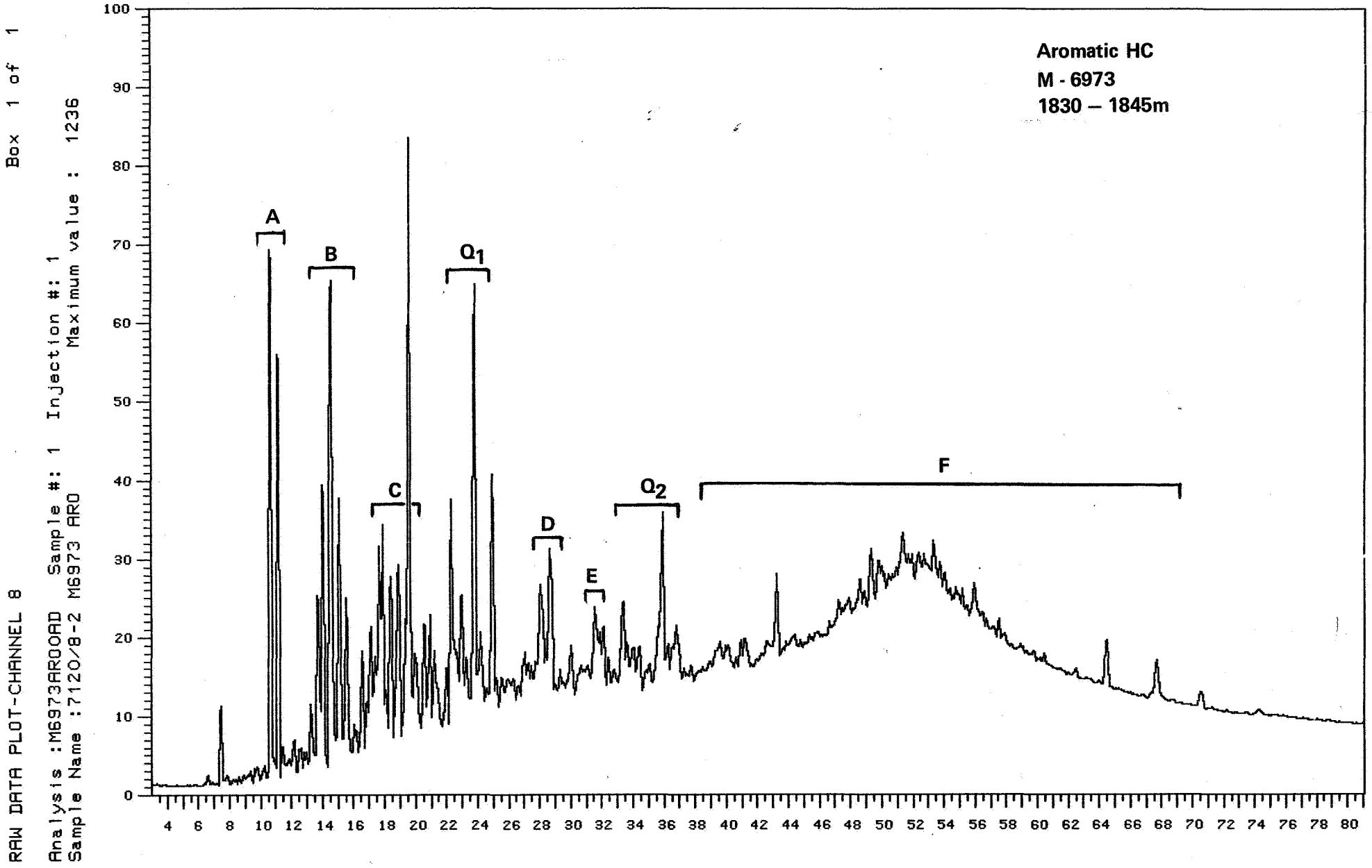
GAS CHROMATOGRAMS OF
AROMATIC FRACTIONS

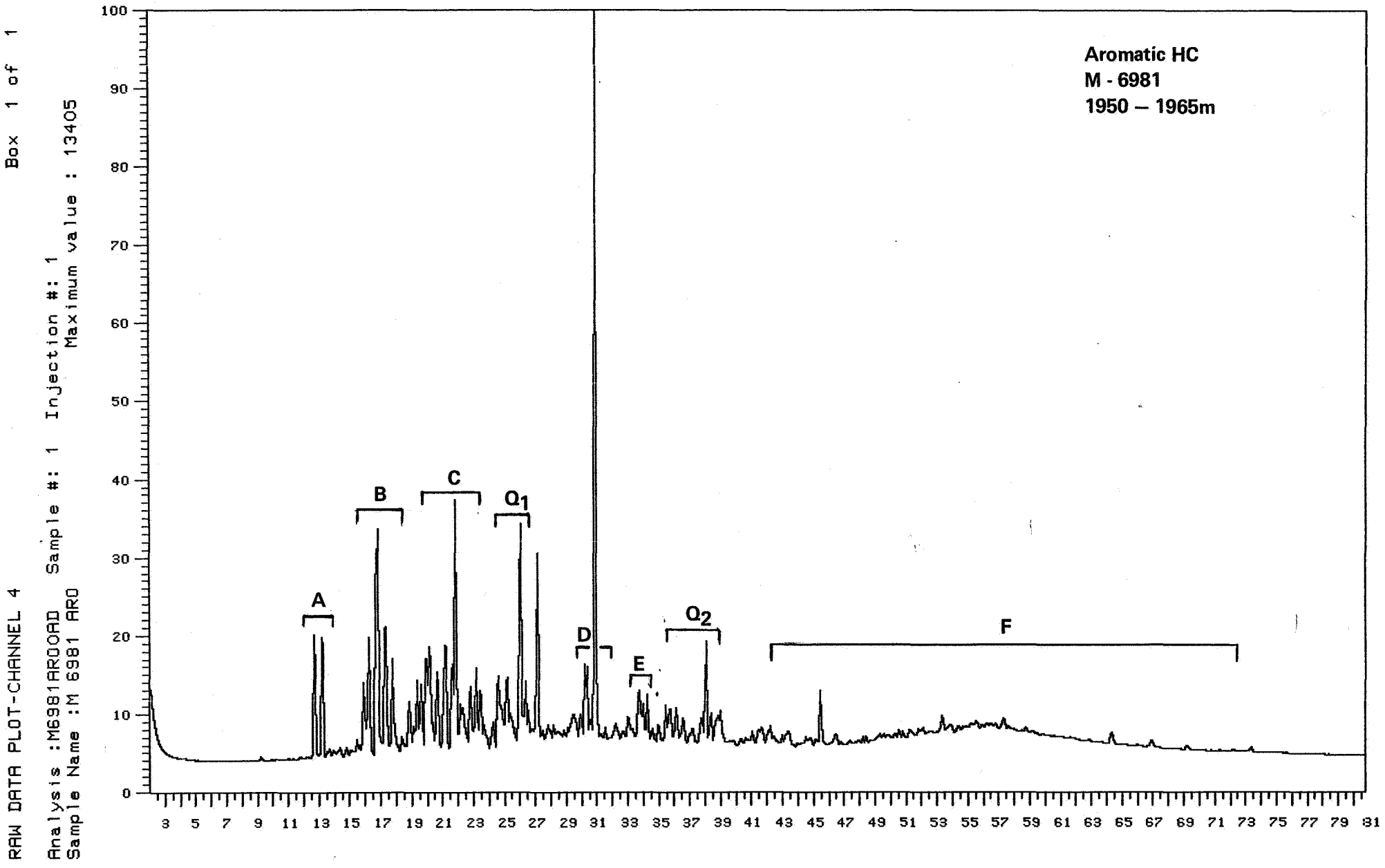
N - naphthalene
A - methyl-naphthalenes
B - C_2-naphthalenes
C - C_3-naphthalenes
P - phenanthrenes
D - methyl-phenanthrenes
E - C_2-phenanthrenes

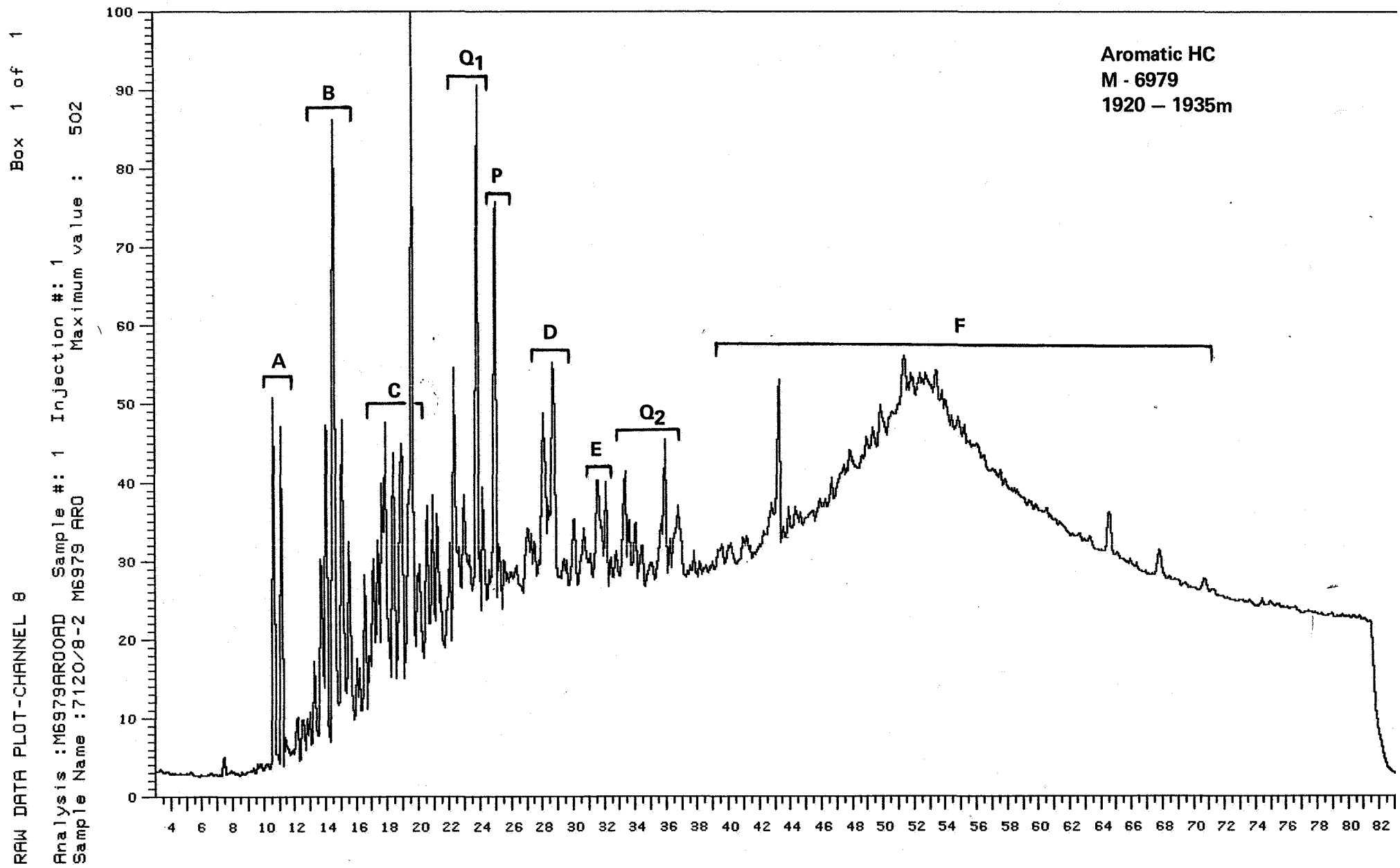

RAW DATA PLOT-CHANNEL 8
Box 1 of 1
Analysis :M6909ARODAD Sample #: 1 Injection #: 1
Sample Name :7120/8-2 M6909 ARO Maximum value : 916
Aromatic HC
M - 6909
870 – 885m
A
B
C
P
Q1
D
E
F
100
90
80
70
60
50
40
30
20
10
0
4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82


RAW DATA PLOT-CHANNEL 7
Box 1 of 1
Analysis :0486M6949A2 Sample #: 1 Injection #: 1
Sample Name :M-6949,A,7120/8-2,AD Maximum value : 2085
Aromatic HC
M - 6949
1470 – 1485m
P
D
100
90
80
70
60
50
40
30
20
10
0
5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69


RAW DATA PLOT-CHANNEL 8
Box 1 of 1
Analysis :M6961AROOAD Sample #: 1 Injection #: 1
Sample Name :7120/8-2 M6961 ARO Maximum value : 982
Aromatic HC
M - 6961
1650 – 1665m
A
B
C
Q1
P
D
E
Q2
F

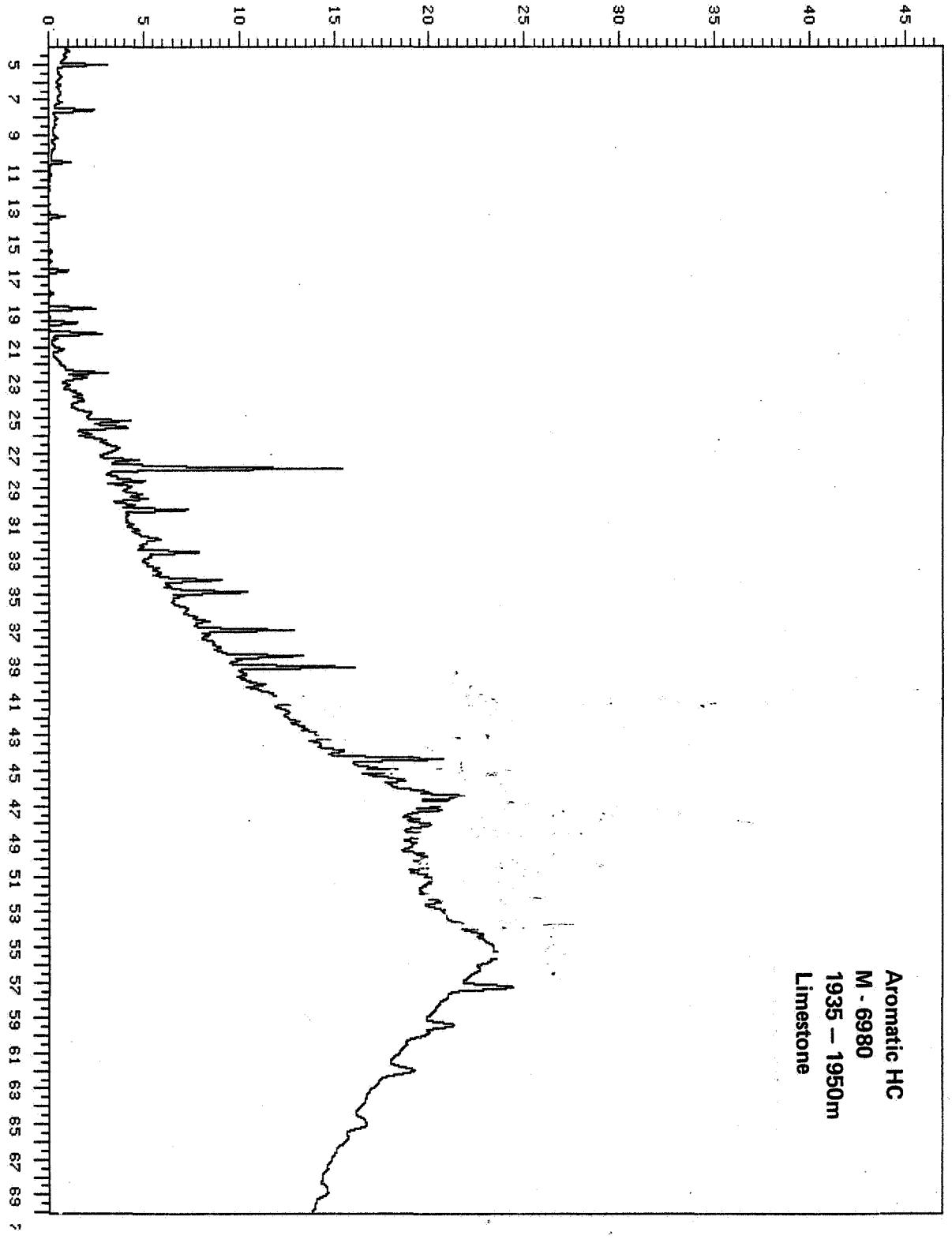

RAW DATA PLOT-CHANNEL 8
Box 1 of 1
Analysis :M6973AROORD Sample #: 1 Injection #: 1
Sample Name :7120/8-2 M6973 ARO Maximum value : 1236
Aromatic HC
M - 6973
1830 – 1845m
A
B
C
Q1
D
E
Q2
F

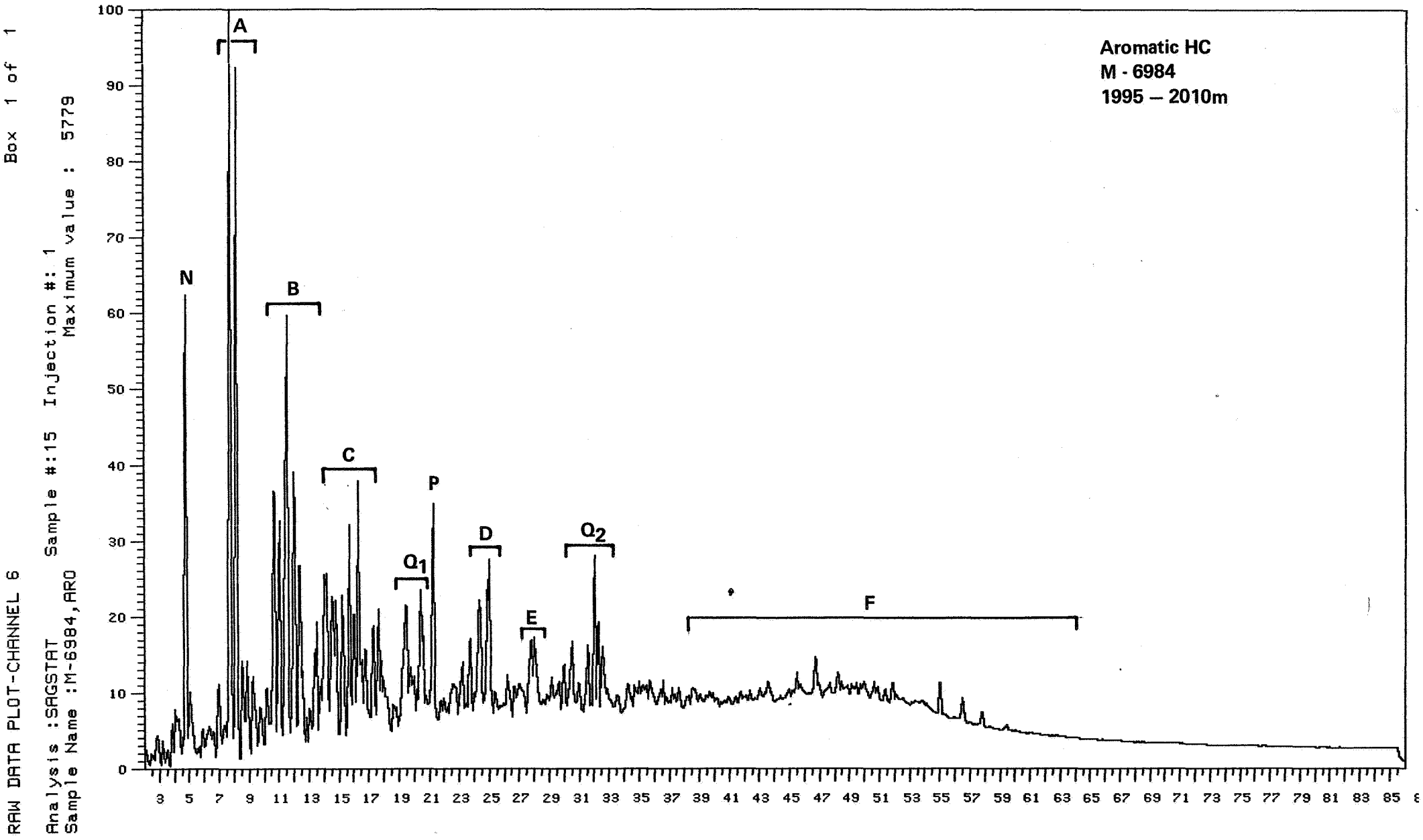

Aromatic HC
M - 6981
1950 – 1965m
RAW DATA PLOT-CHANNEL 4
Box 1 of 1
Analysis :M6981AROOAD Sample #: 1 Injection #: 1
Sample Name :M 6981 ARO Maximum value : 13405
A
B
C
Q1
D
E
Q2
F

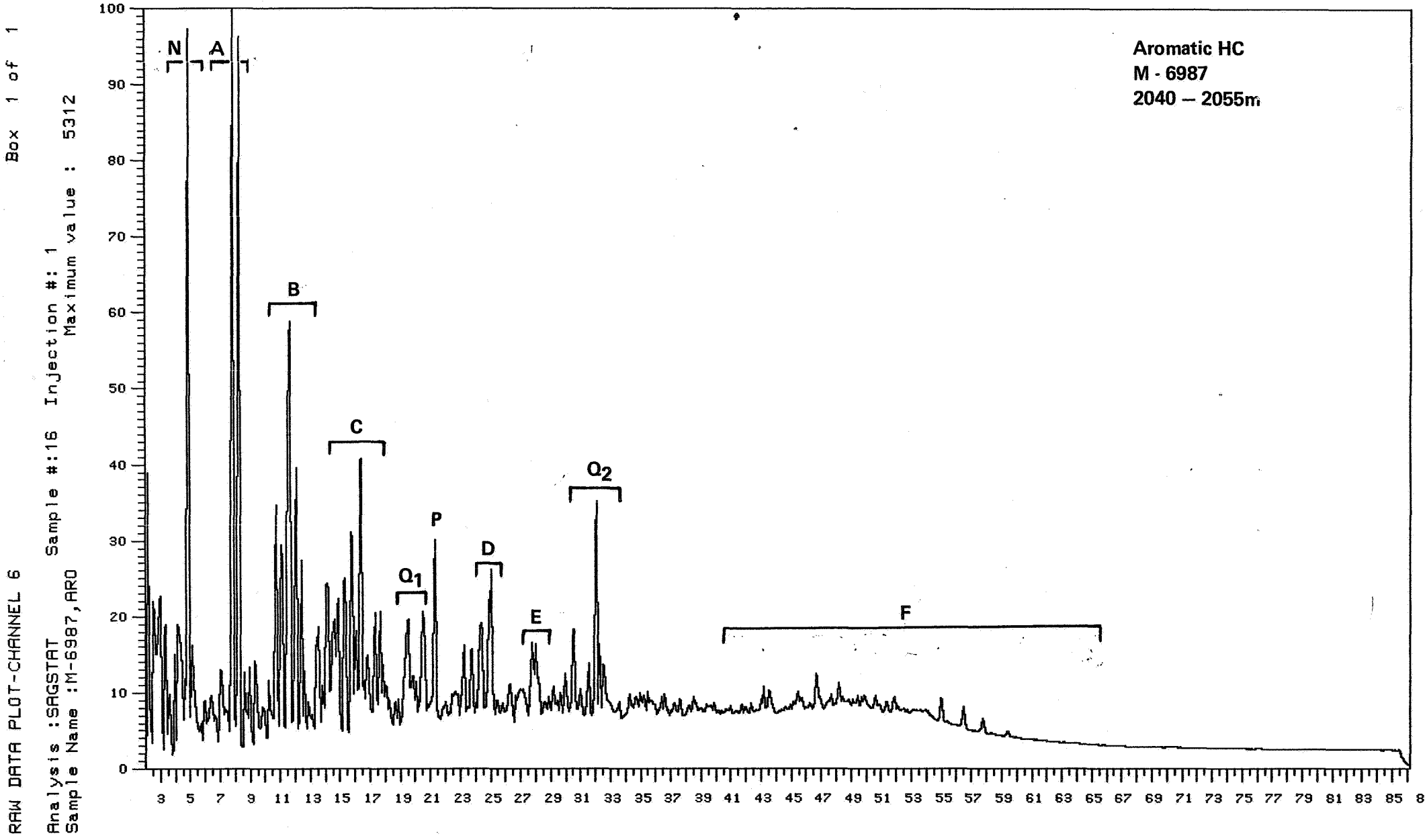

RAW DATA PLOT-CHANNEL 8
Box 1 of 1
Analysis :M6979AROOAD Sample #: 1 Injection #: 1
Sample Name :7120/8-2 M6979 ARO Maximum value : 502
Aromatic HC
M - 6979
1920 – 1935m
A
B
C
Q1
P
D
E
Q2
F
0
10
20
30
40
50
60
70
80
90
100
4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82

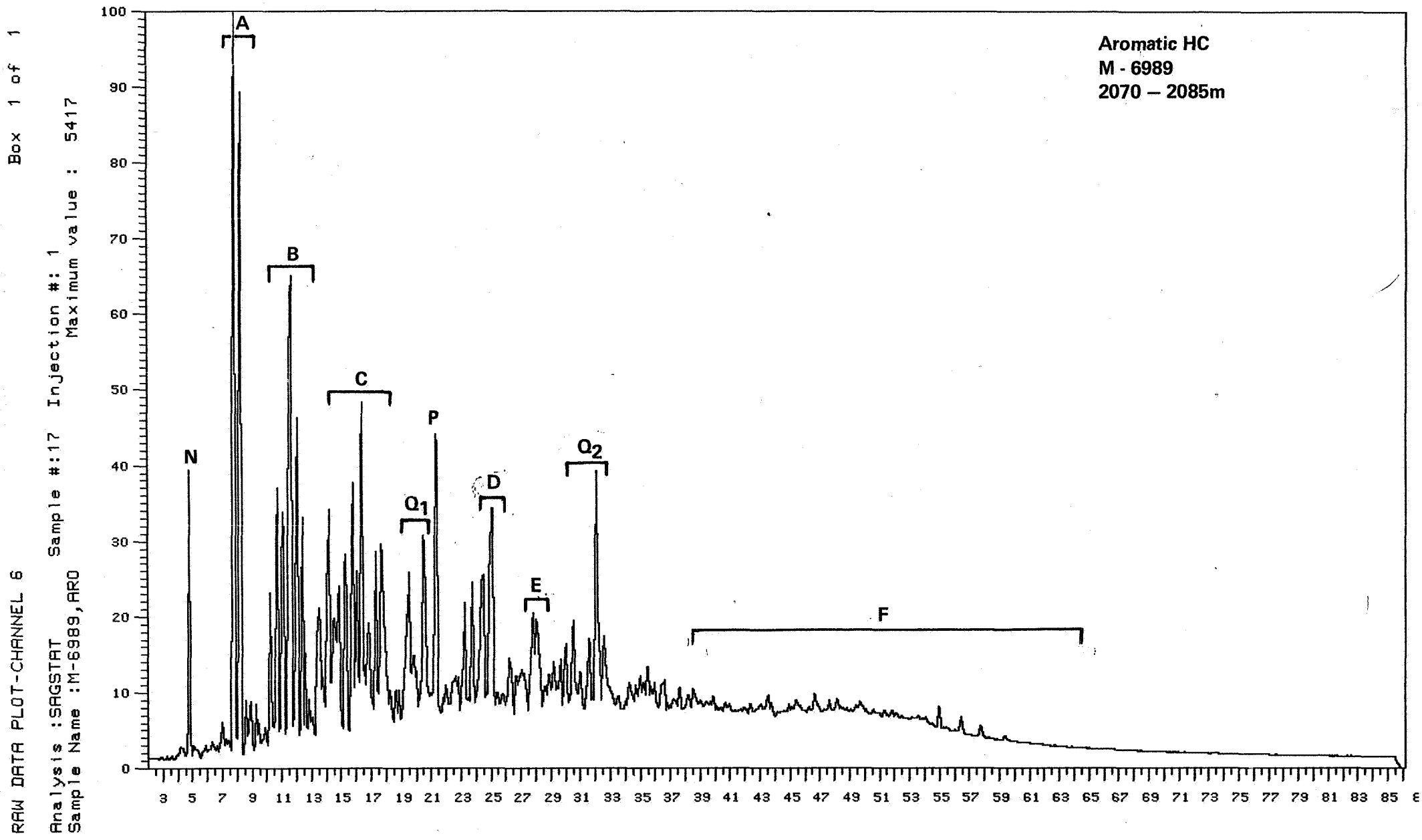
RAW DATA PLOT-CHANNEL 7 Box 1 of 1

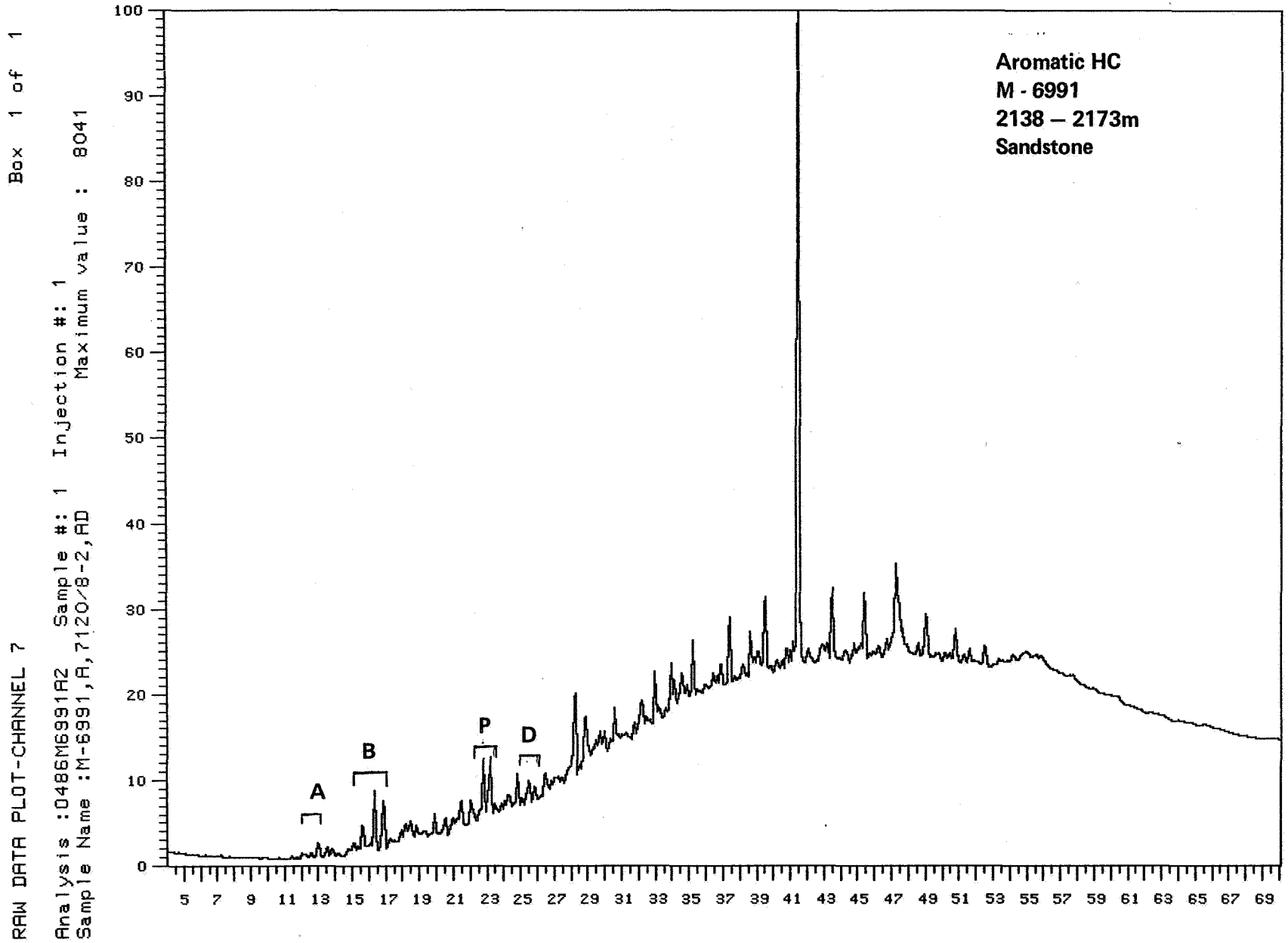
Analysis :0486M6980A3 Sample #: 1 Injection #: 1
Sample Name :M-6980,7120/8-2,AD Maximum value : 5747

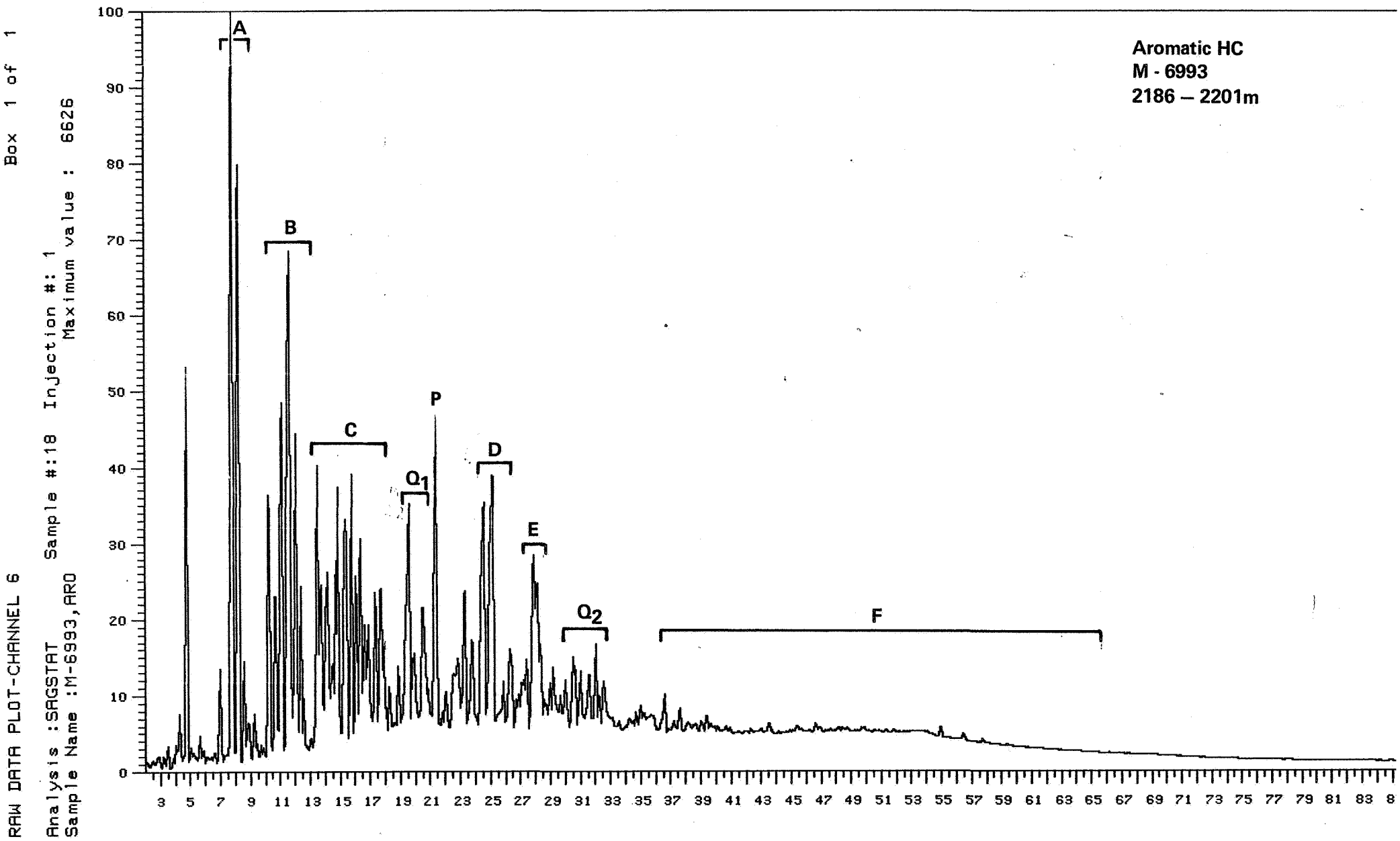


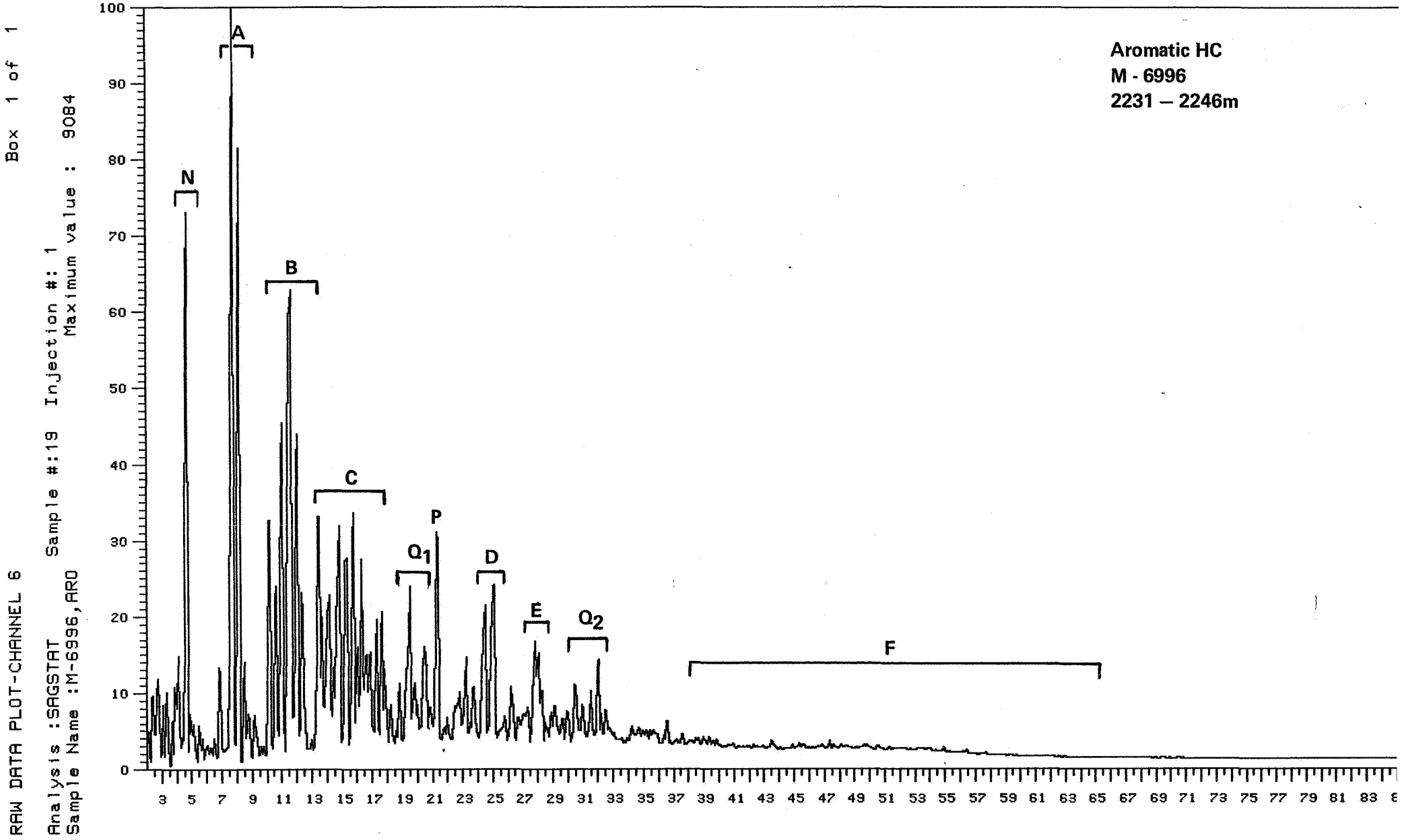

RAW DATA PLOT-CHANNEL 6
Box 1 of 1
Analysis :SAGSTAT Sample #:15 Injection #: 1
Sample Name :M-6984,ARO Maximum value : 5779
Aromatic HC
M - 6984
1995 – 2010m
N
A
B
C
P
Q1
D
E
Q2
F

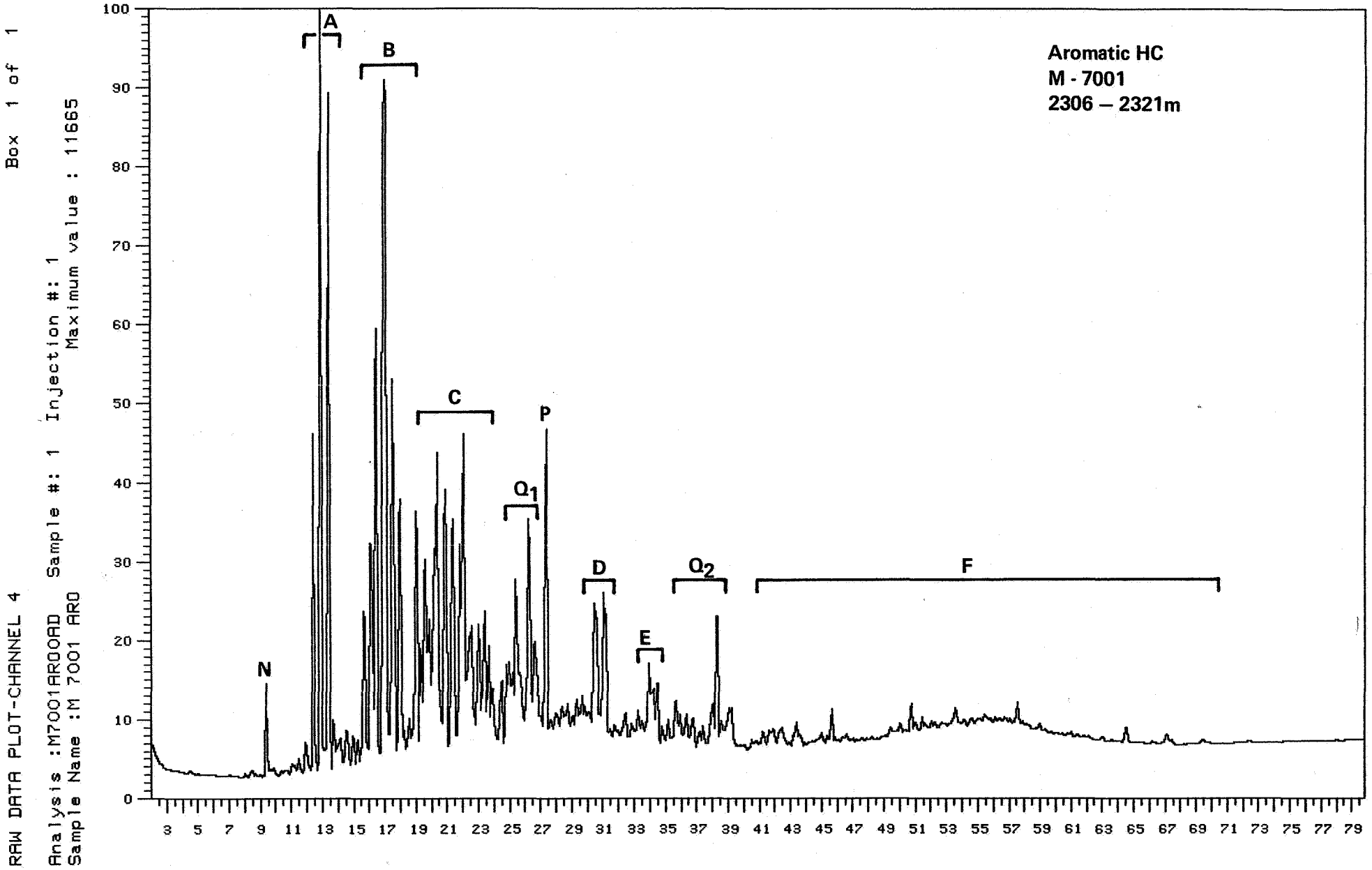

RAW DATA PLOT-CHANNEL 6
Box 1 of 1
Analysis :SAGSTAT
Sample Name :M-6987,ARO
Sample #:16 Injection #: 1
Maximum value : 5312
Aromatic HC
M - 6987
2040 – 2055m
N
A
B
C
Q1
P
D
E
Q2
F

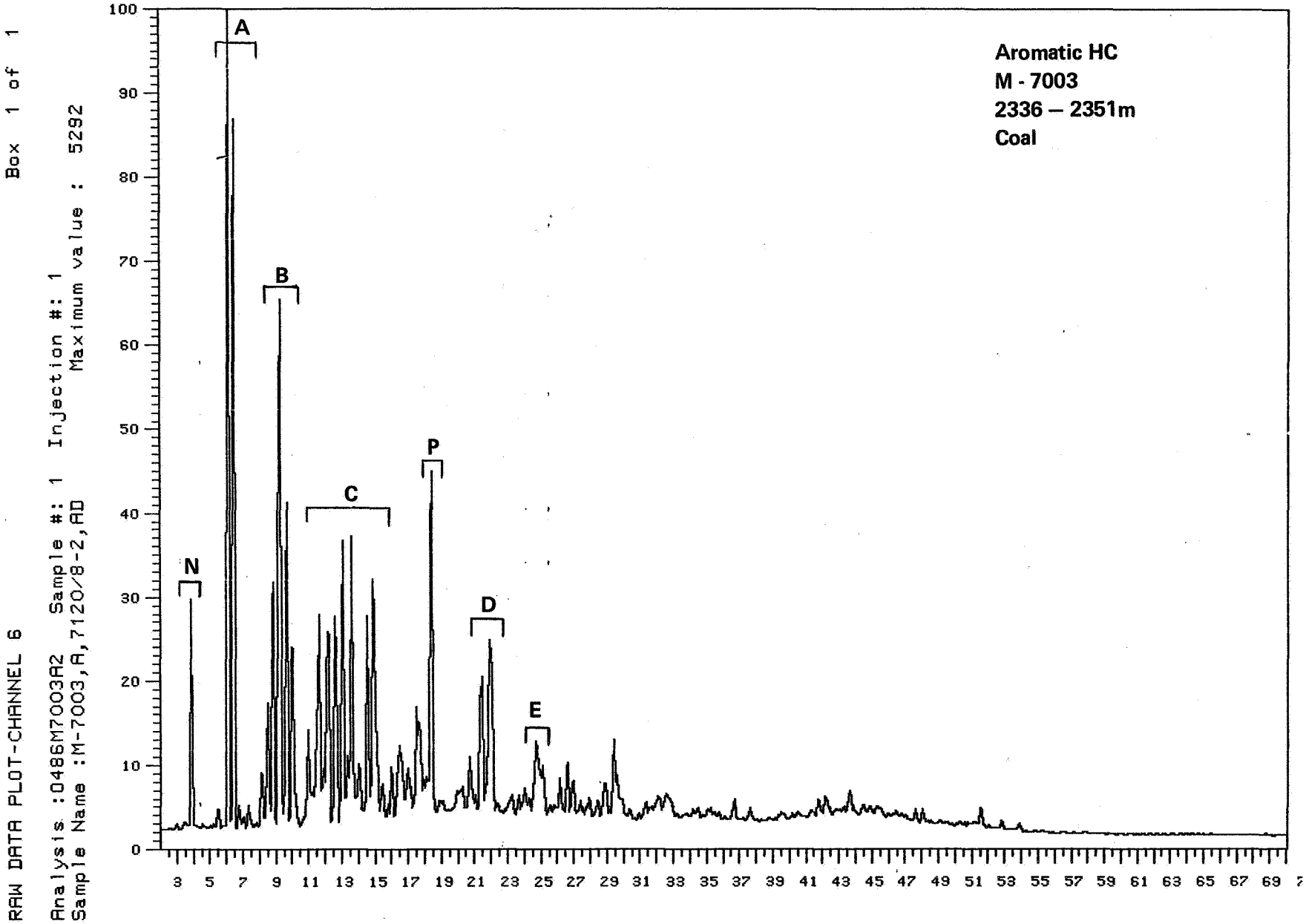

RAW DATA PLOT-CHANNEL 6
Box 1 of 1
Analysis :SAGSTAT
Sample Name :M-6989,ARO
Sample #:17 Injection #: 1
Maximum value : 5417
Aromatic HC
M - 6989
2070 – 2085m
A
B
C
N
P
Q1
D
E
Q2
F
100
90
80
70
60
50
40
30
20
10
0
3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85

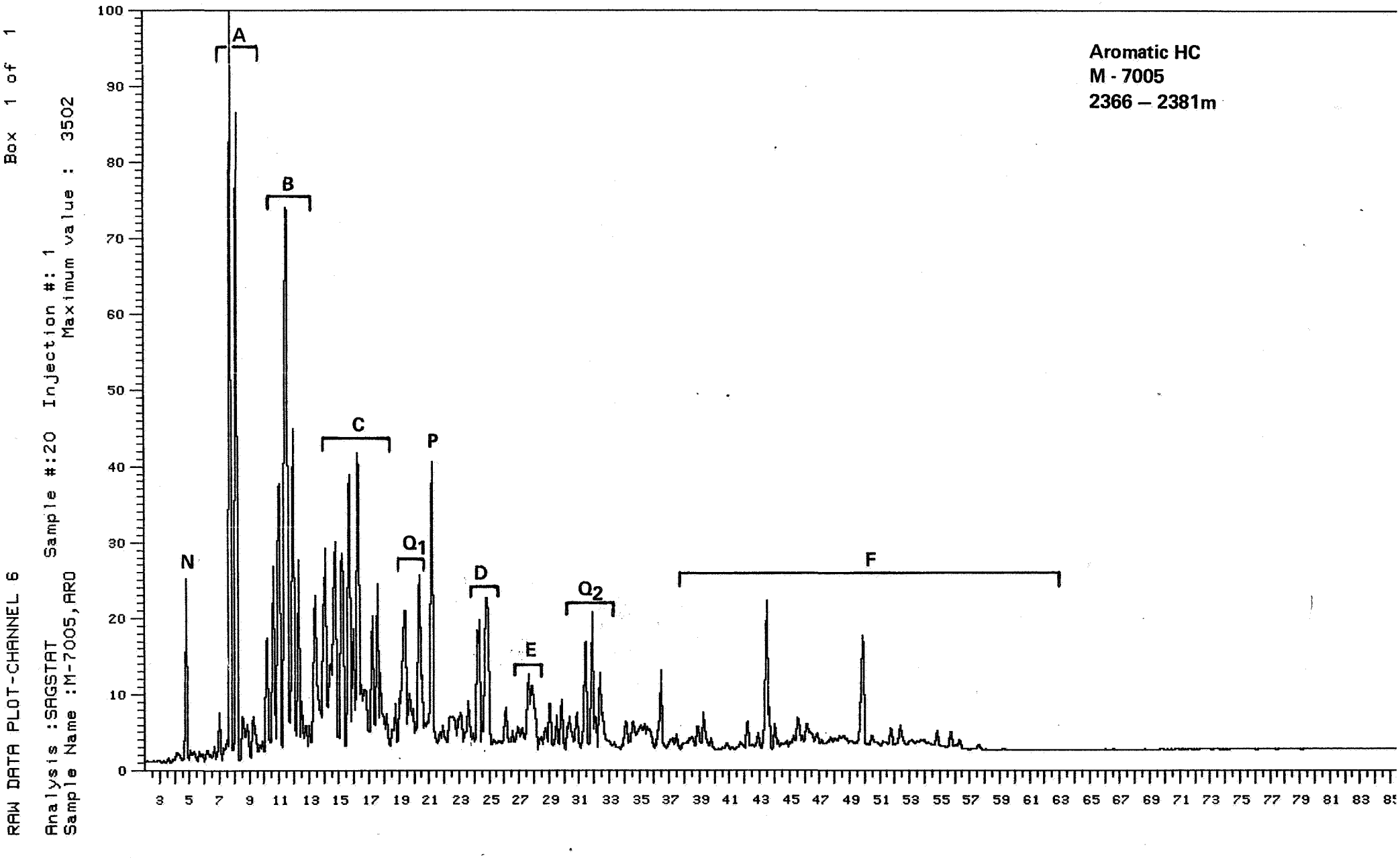

RAW DATA PLOT-CHANNEL 7
Box 1 of 1
Analysis :0486M6991A2 Sample #: 1 Injection #: 1
Sample Name :M-6991,A,7120/8-2,AD Maximum value : 8041
Aromatic HC
M - 6991
2138 – 2173m
Sandstone
A
B
P
D


RAW DATA PLOT-CHANNEL 6
Box 1 of 1
Analysis :SAGSTAT
Sample Name :M-6993,ARO
Sample #:18 Injection #: 1
Maximum value : 6626
Aromatic HC
M - 6993
2186 – 2201m
A
B
C
P
Q1
D
E
Q2
F

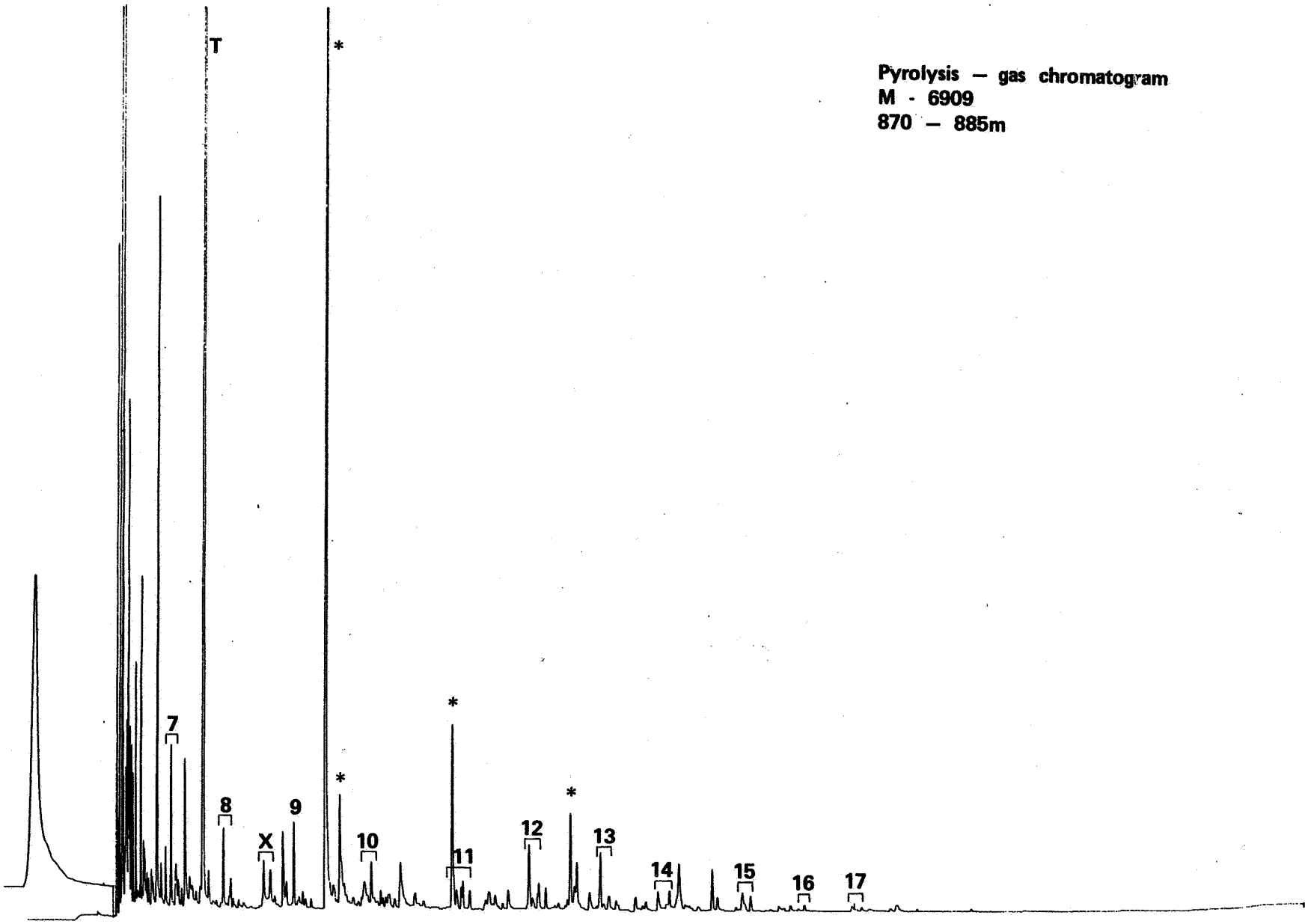

Box 1 of 1
RAW DATA PLOT-CHANNEL 6
Analysis :SAGSTAT
Sample Name :M-6996,ARO
Sample #:19 Injection #: 1
Maximum value : 9084
Aromatic HC
M - 6996
2231 – 2246m
N
A
B
C
P
Q_1
D
E
Q_2
F


RAW DATA PLOT-CHANNEL 4
Box 1 of 1
Analysis :M7001ARDOAD Sample #: 1 Injection #: 1
Sample Name :M 7001 ARD Maximum value : 11665
Aromatic HC
M - 7001
2306 – 2321m
A
B
C
P
Q1
D
E
Q2
F
N
100
90
80
70
60
50
40
30
20
10
0
3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79


RAW DATA PLOT-CHANNEL 6
Box 1 of 1
Analysis :0486M7003A2 Sample #: 1 Injection #: 1
Sample Name :M-7003,A,7120/8-2,AD Maximum value : 5292
Aromatic HC
M - 7003
2336 – 2351m
Coal
A
B
C
P
D
E
N
100
90
80
70
60
50
40
30
20
10
0
3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69

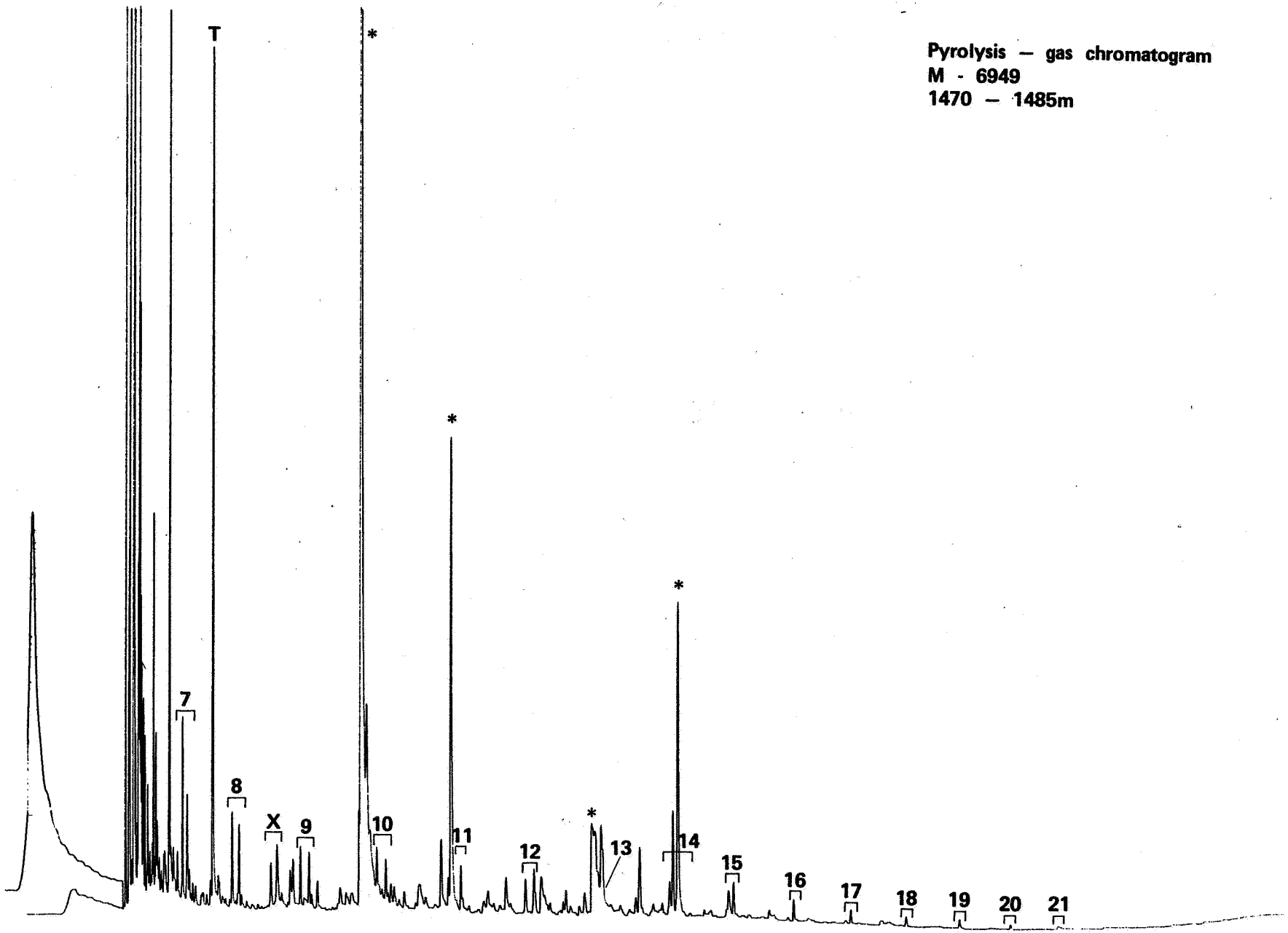

RAW DATA PLOT-CHANNEL 6
Box 1 of 1
Analysis :SAGSTAT
Sample Name :M-7005,ARO
Sample #:20 Injection #: 1
Maximum value : 3502
Aromatic HC
M - 7005
2366 – 2381m
A
B
C
P
N
Q1
D
E
Q2
F

PYROLYSIS - GAS CHROMATOGRAMS

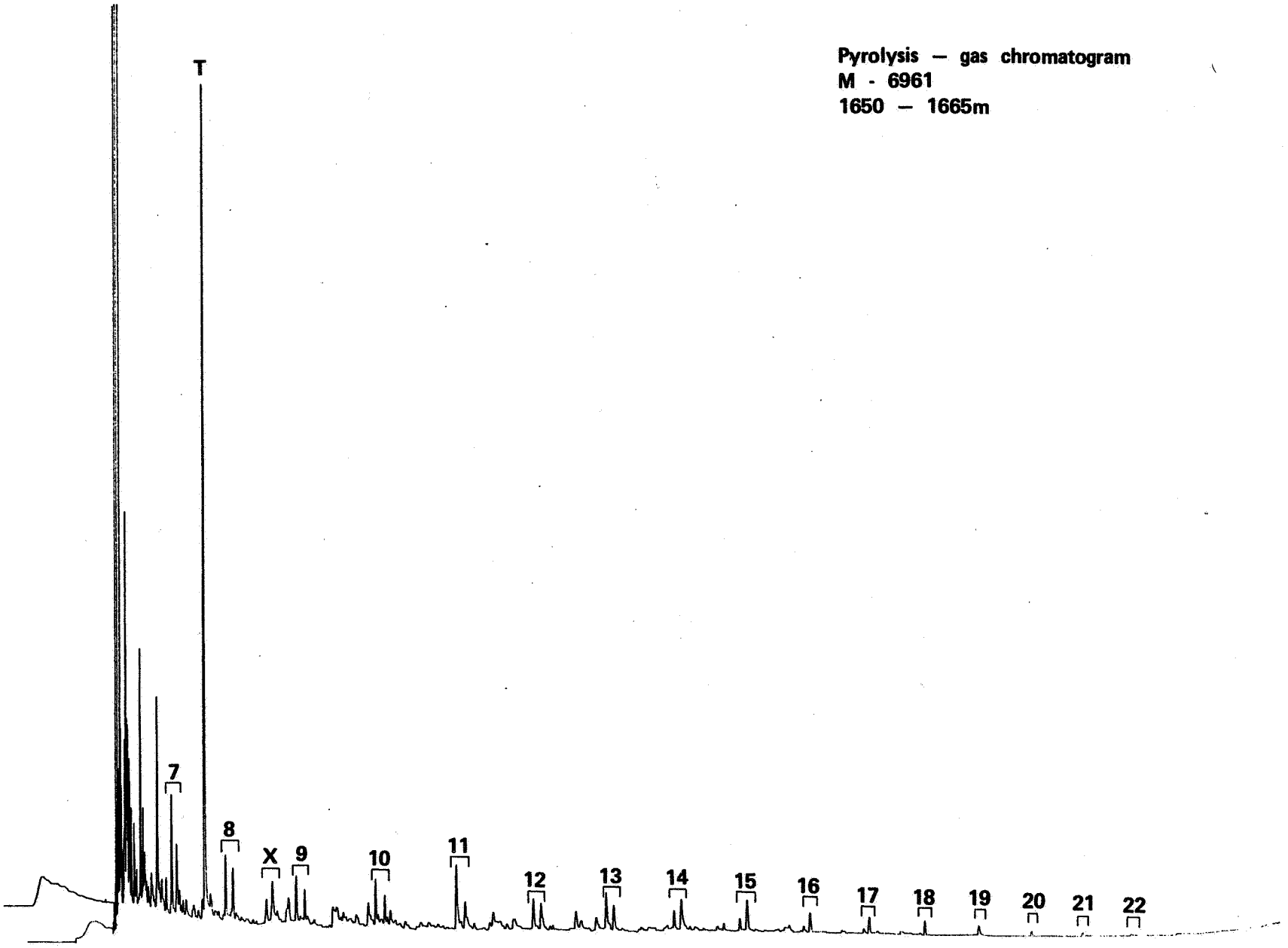


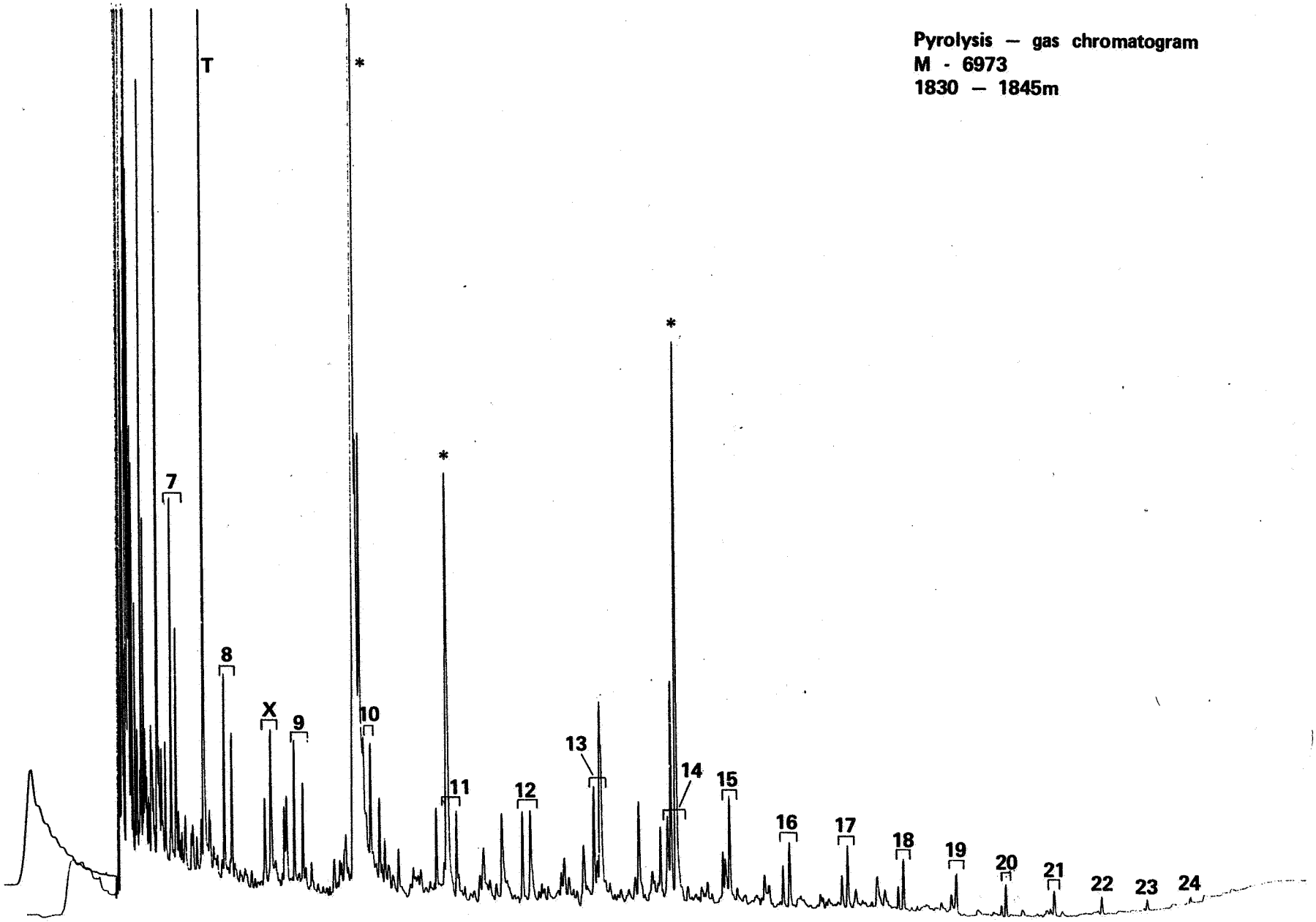
Pyrolysis — gas chromatogram
M - 6909
870 — 885m

Pyrolysis — gas chromatogram
M - 6949
1470 — 1485m

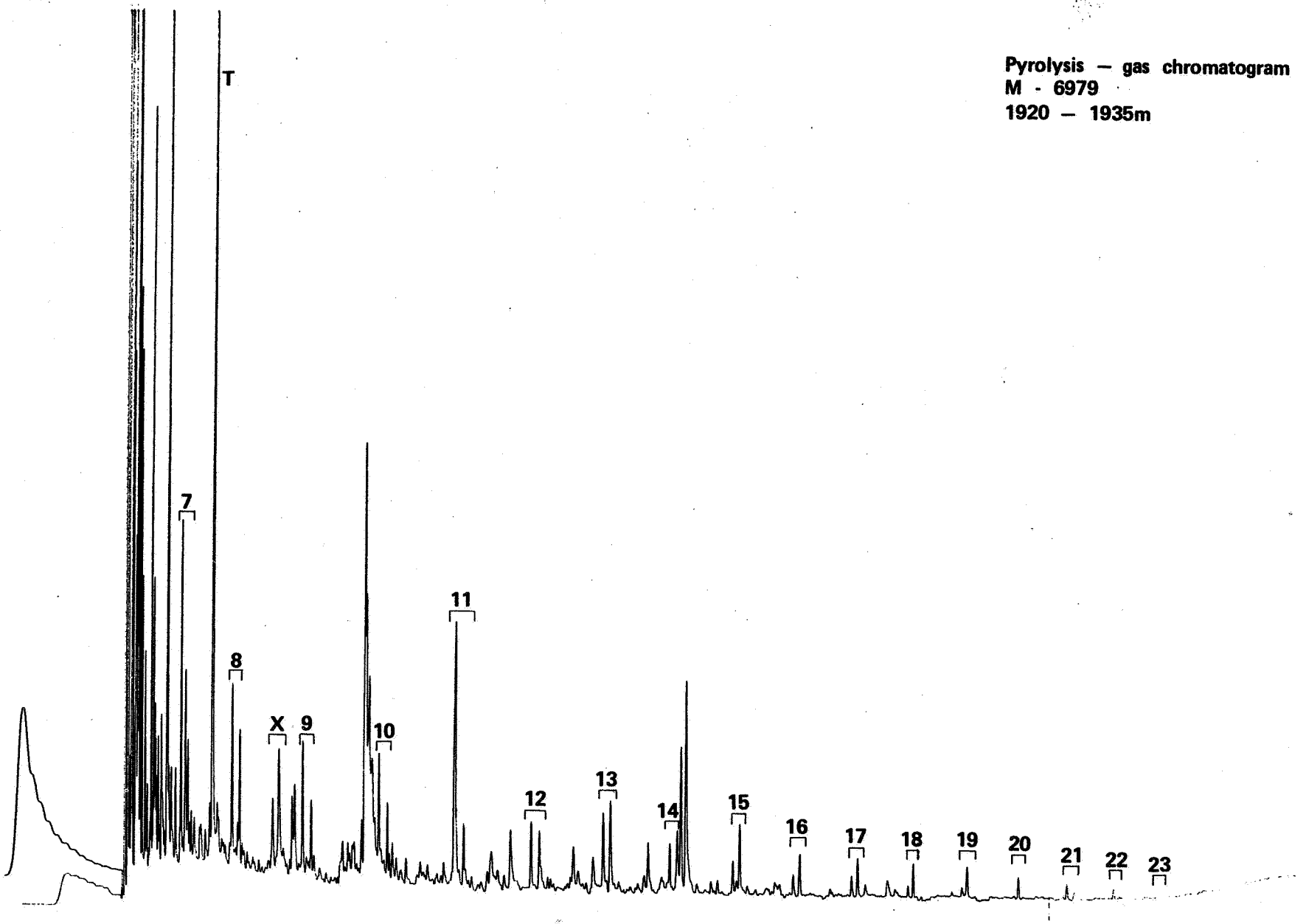


Pyrolysis – gas chromatogram
M - 6961
1650 – 1665m

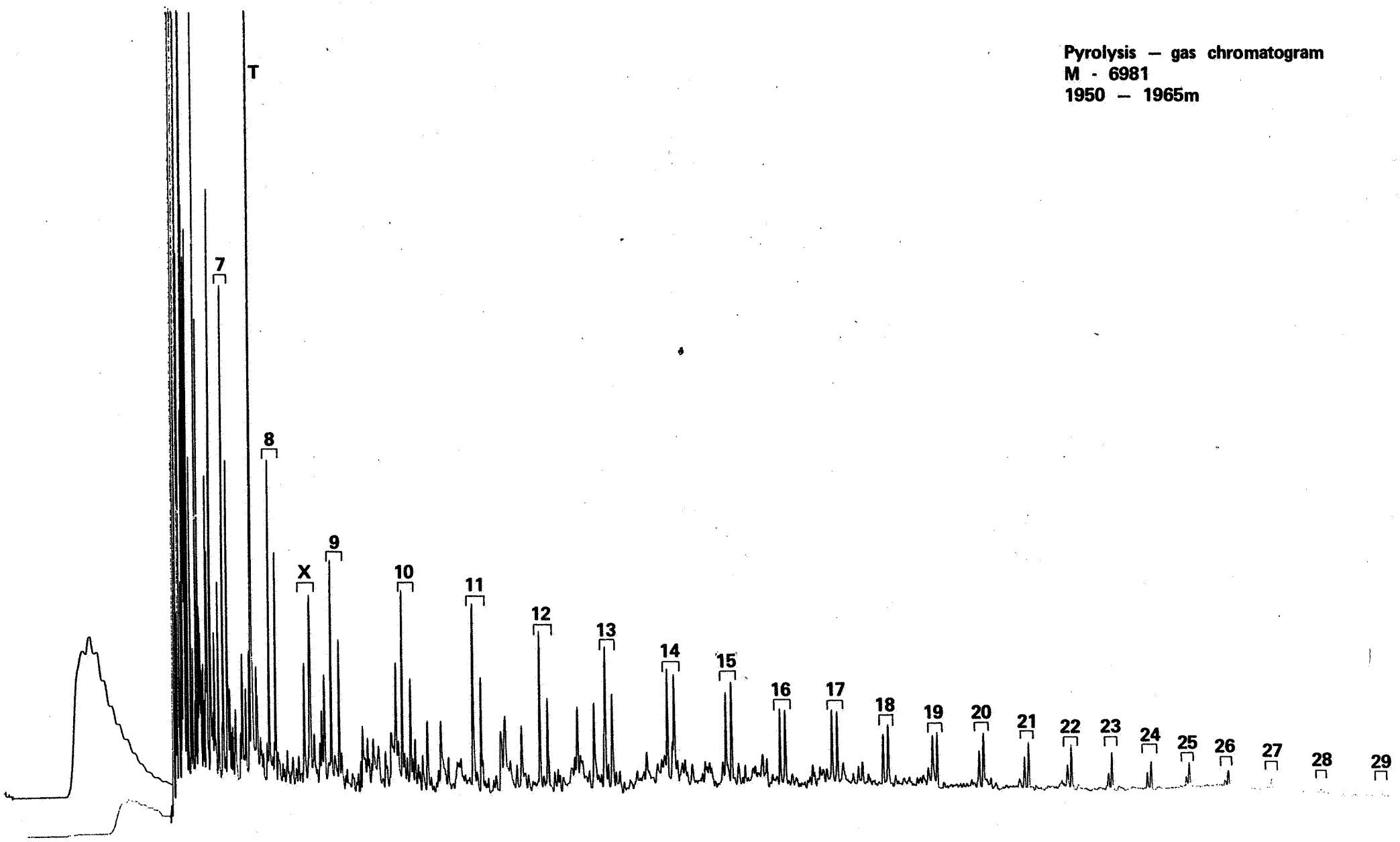


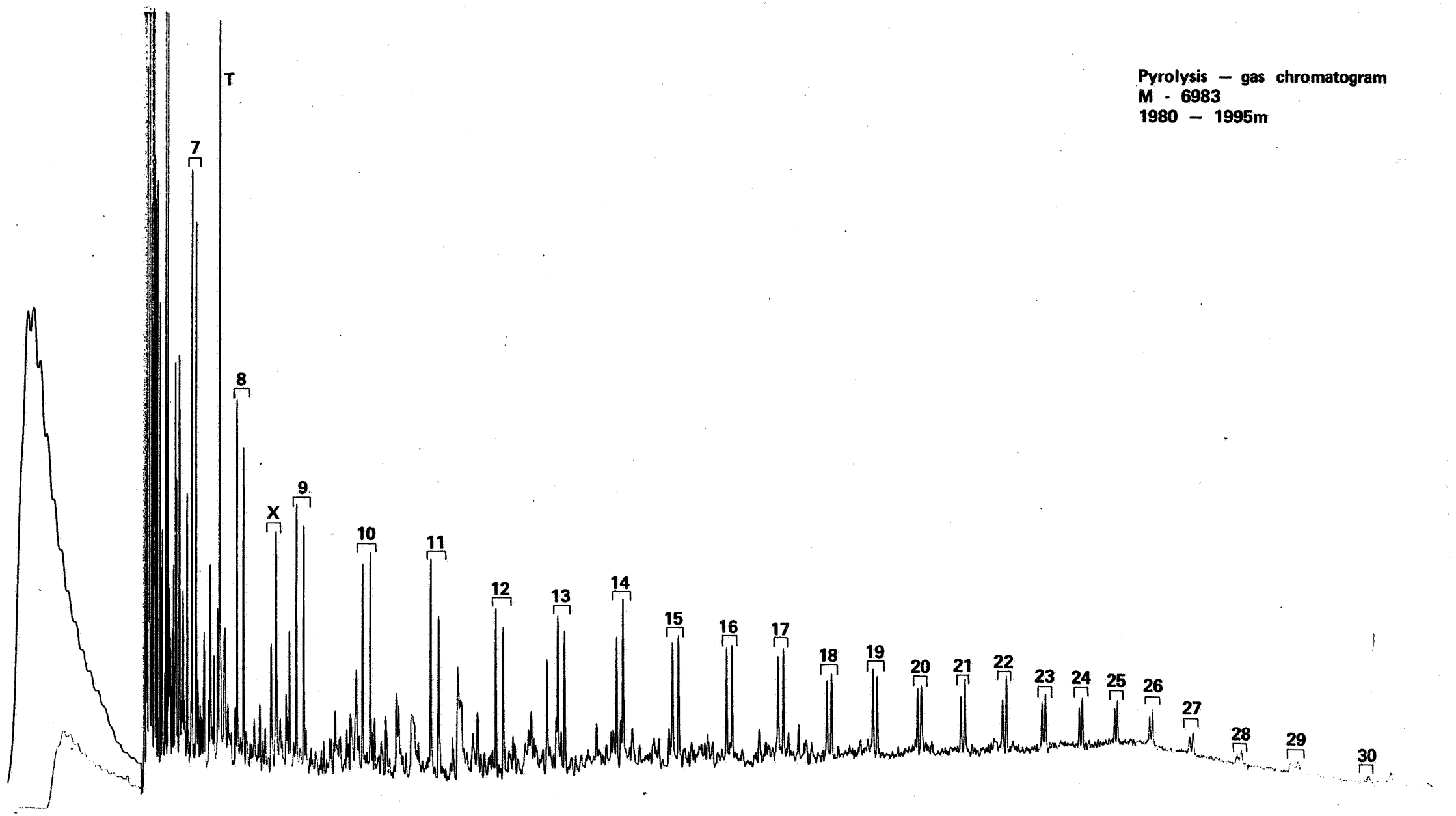

Pyrolysis — gas chromatogram
M - 6973
1830 — 1845m
T
*
7
8
X
9
10
*
11
12
13
*
14
15
16
17
18
19
20
21
22
23
24

Pyrolysis – gas chromatogram
M - 6979
1920 – 1935m

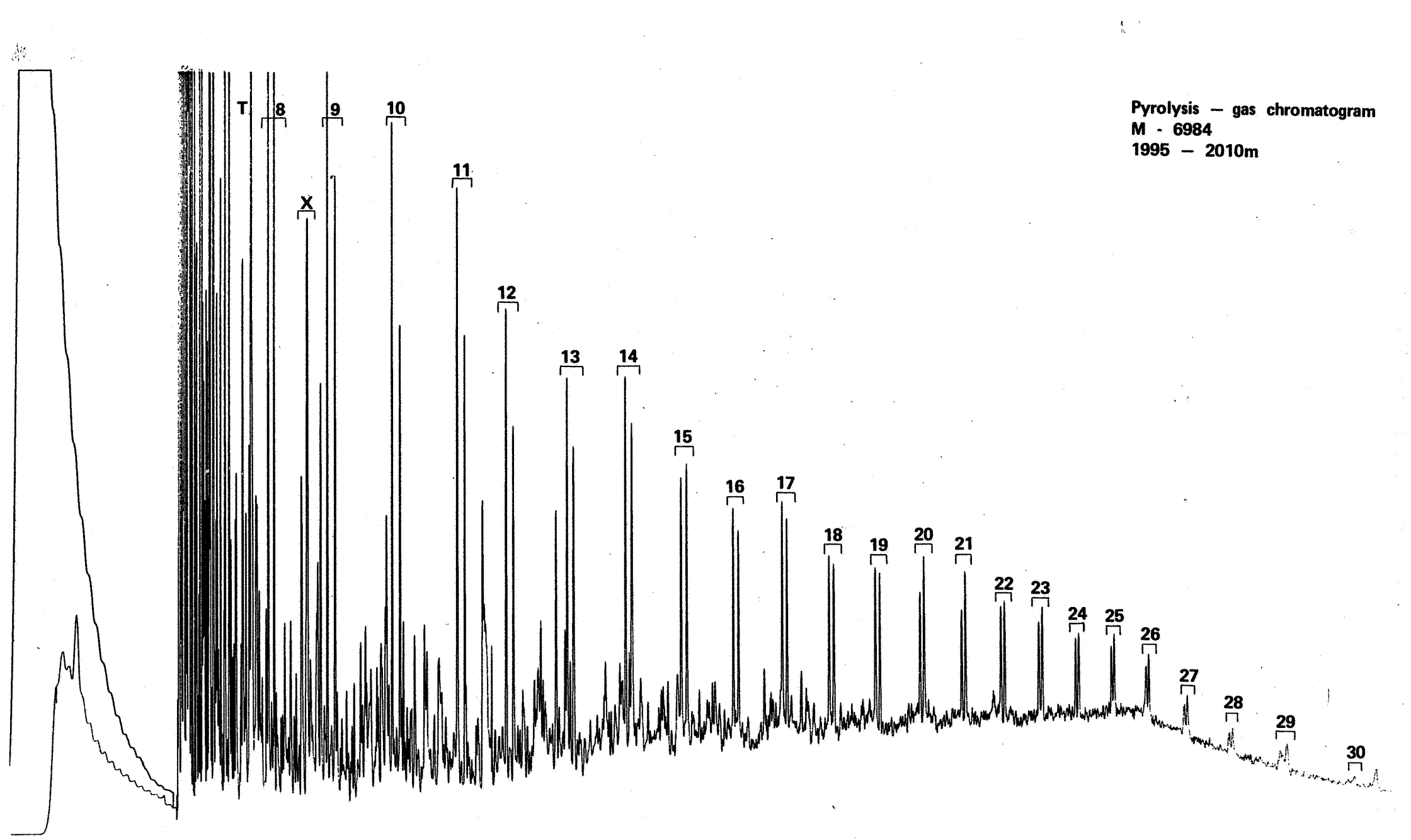


Pyrolysis — gas chromatogram
M - 6981
1950 — 1965m

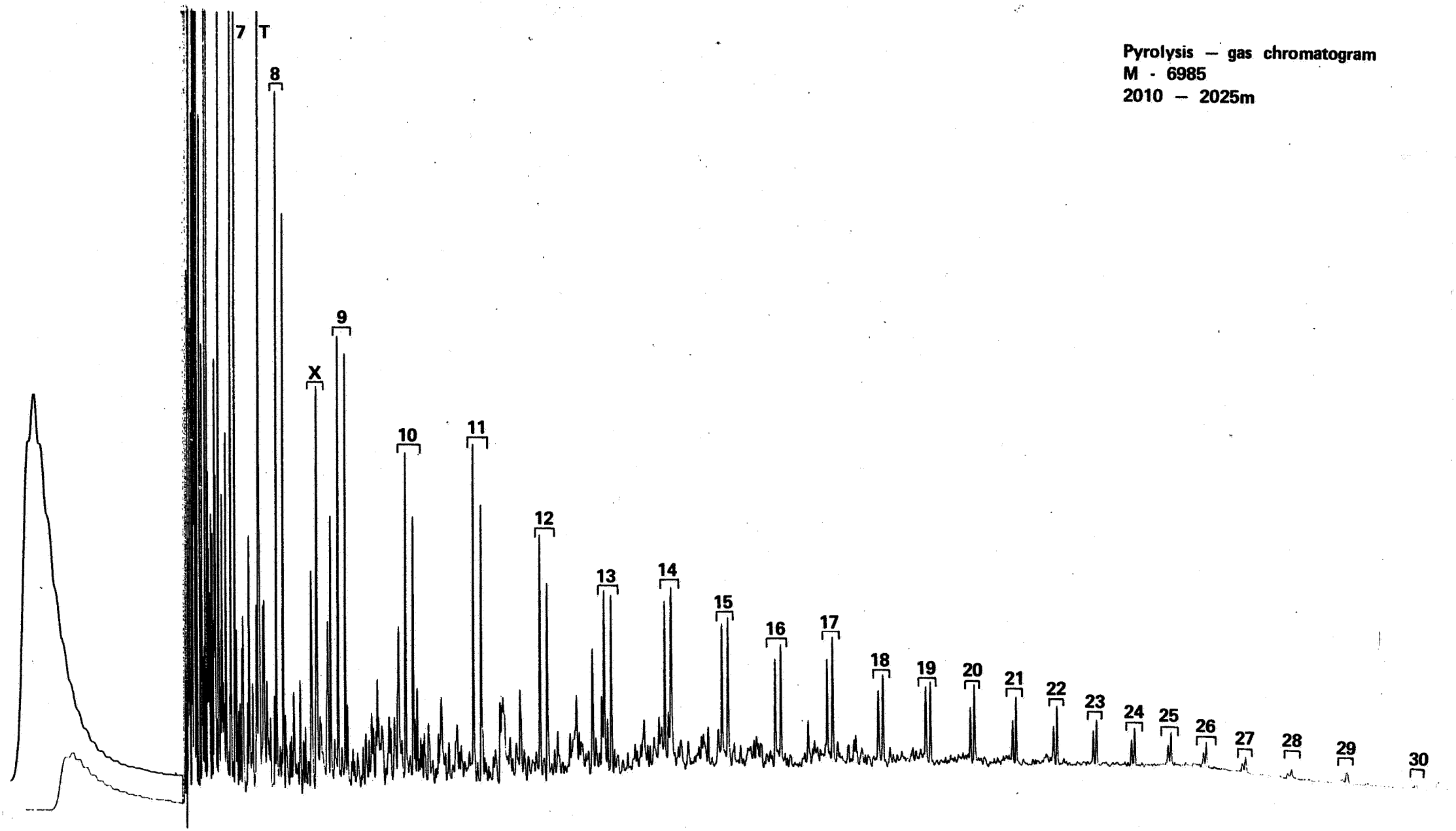


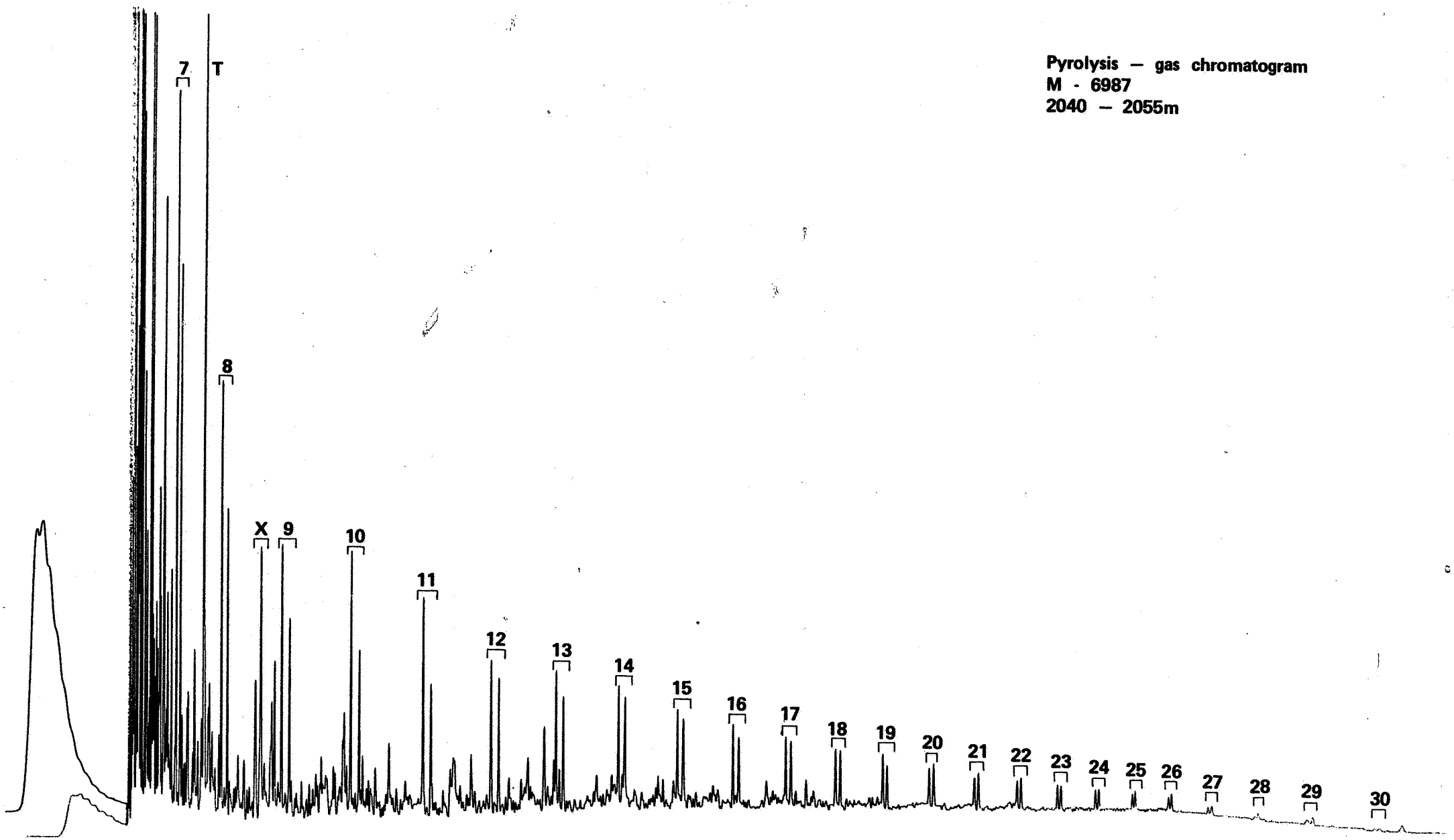


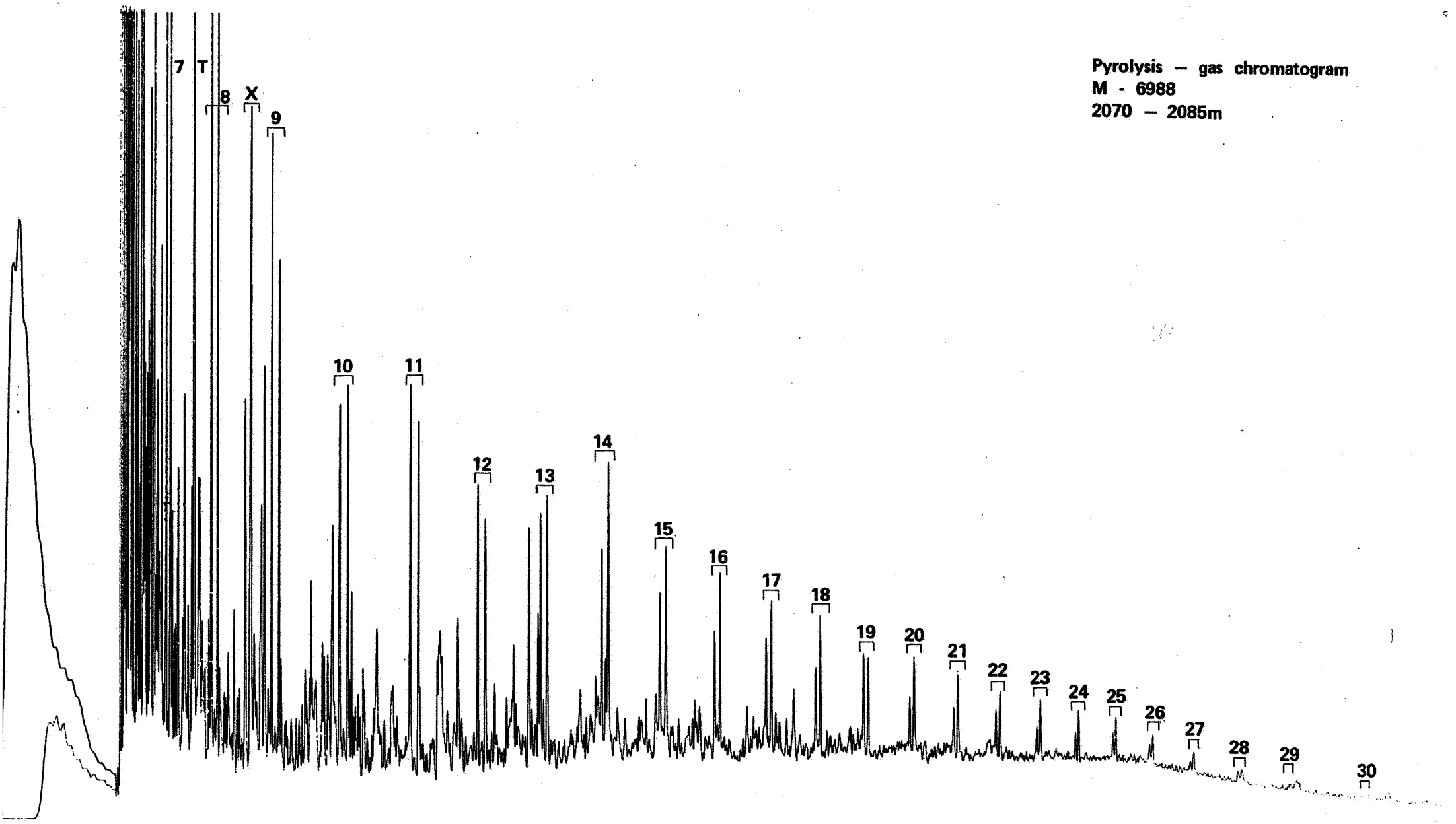
Pyrolysis — gas chromatogram
M - 6983
1980 — 1995m


Pyrolysis — gas chromatogram
M - 6984
1995 — 2010m
T
8
9
10
11
X
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

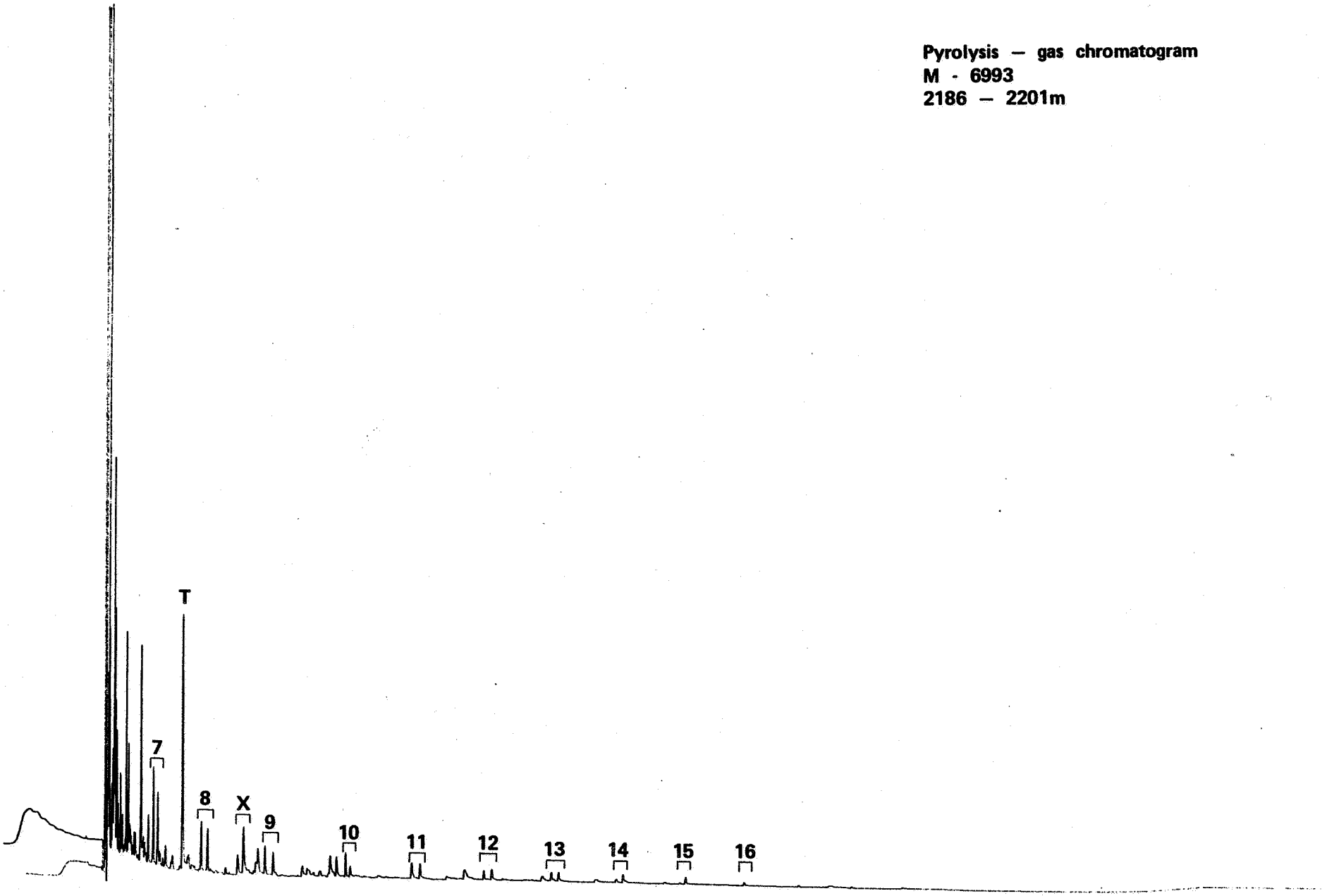
Pyrolysis — gas chromatogram
M - 6985
2010 — 2025m

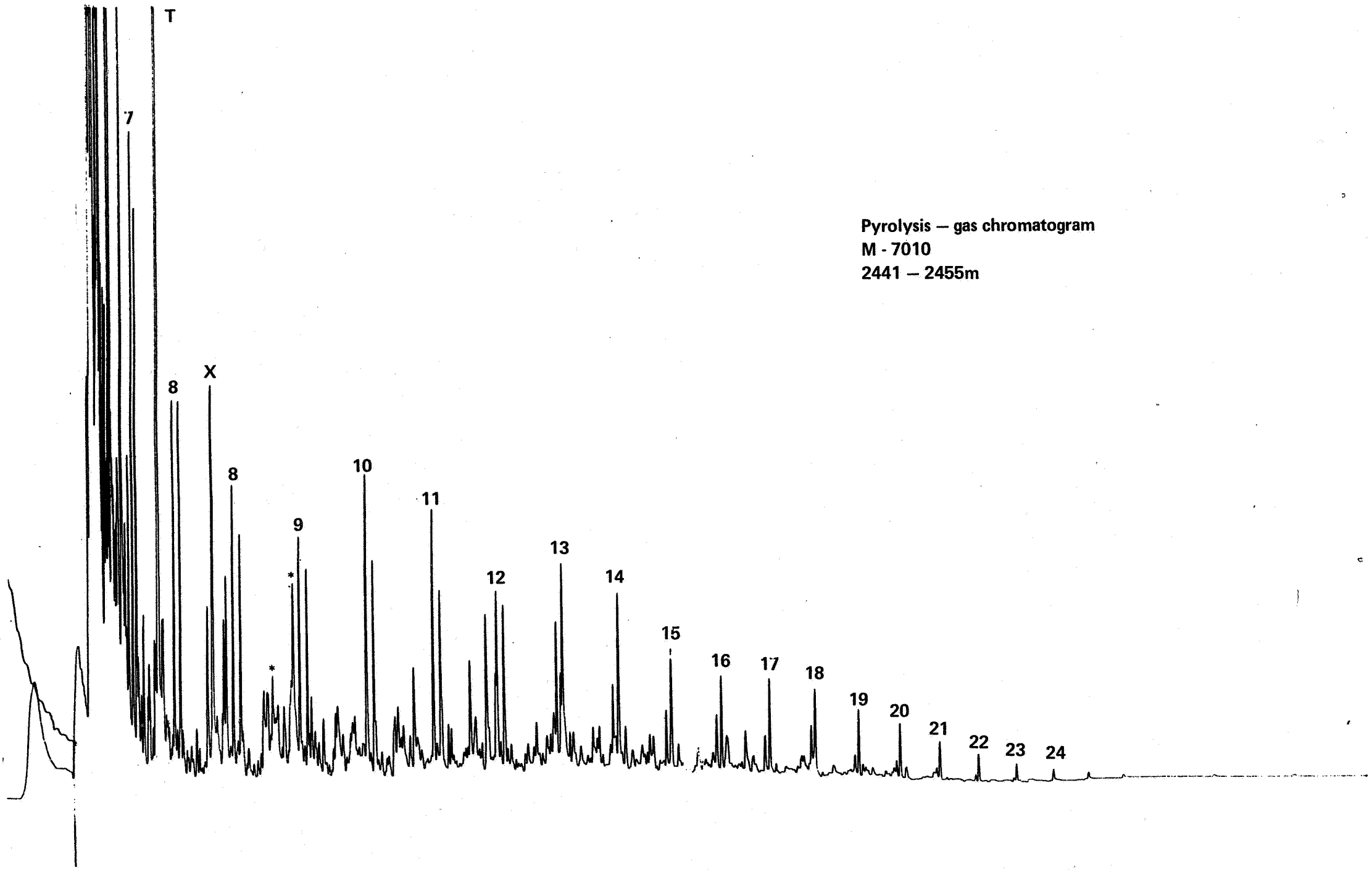



Pyrolysis — gas chromatogram
M - 6987
2040 — 2055m
7
T
8
X
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

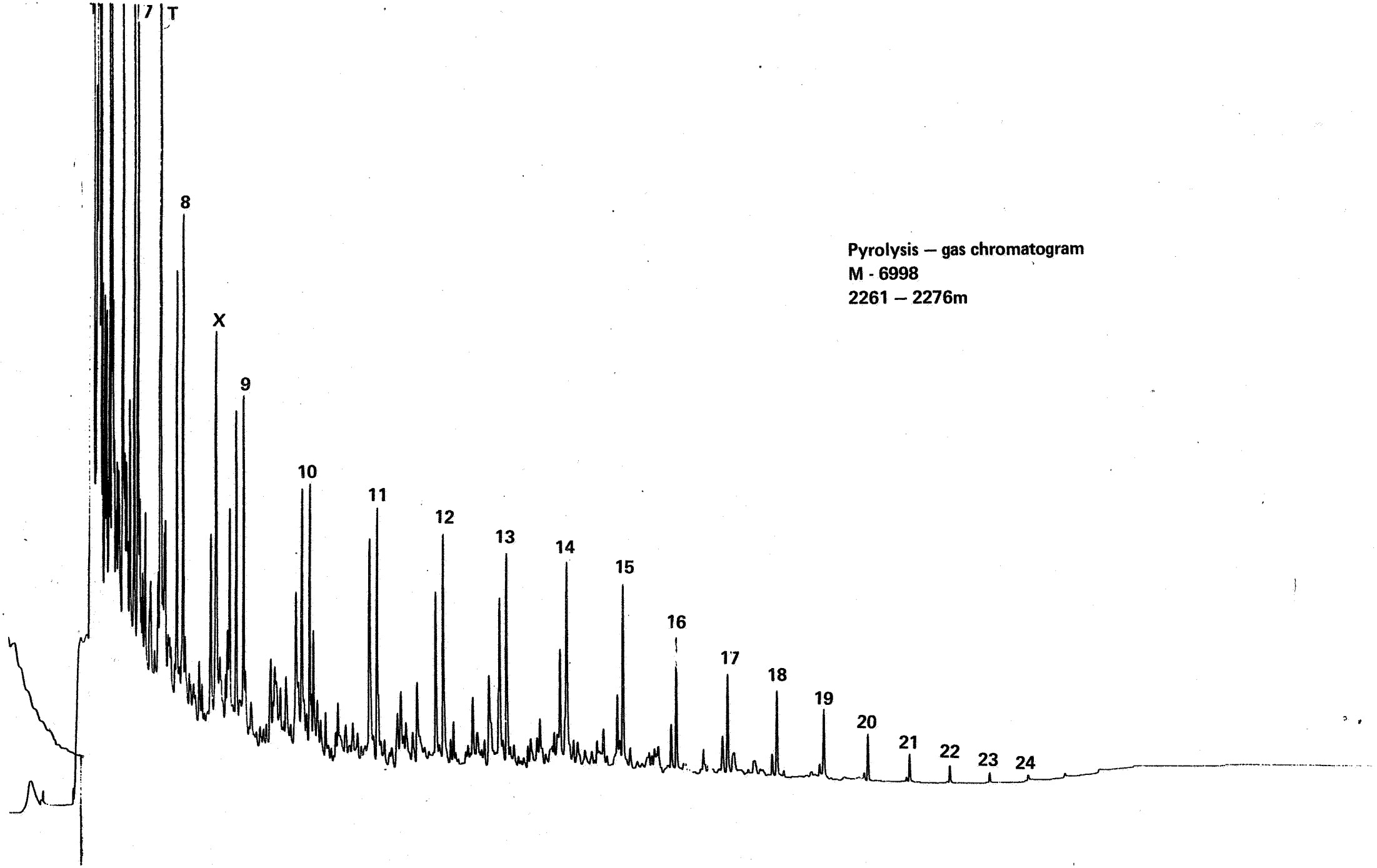

Pyrolysis — gas chromatogram
M - 6988
2070 — 2085m
7
T
8
X
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

Pyrolysis — gas chromatogram
M - 6993
2186 — 2201m

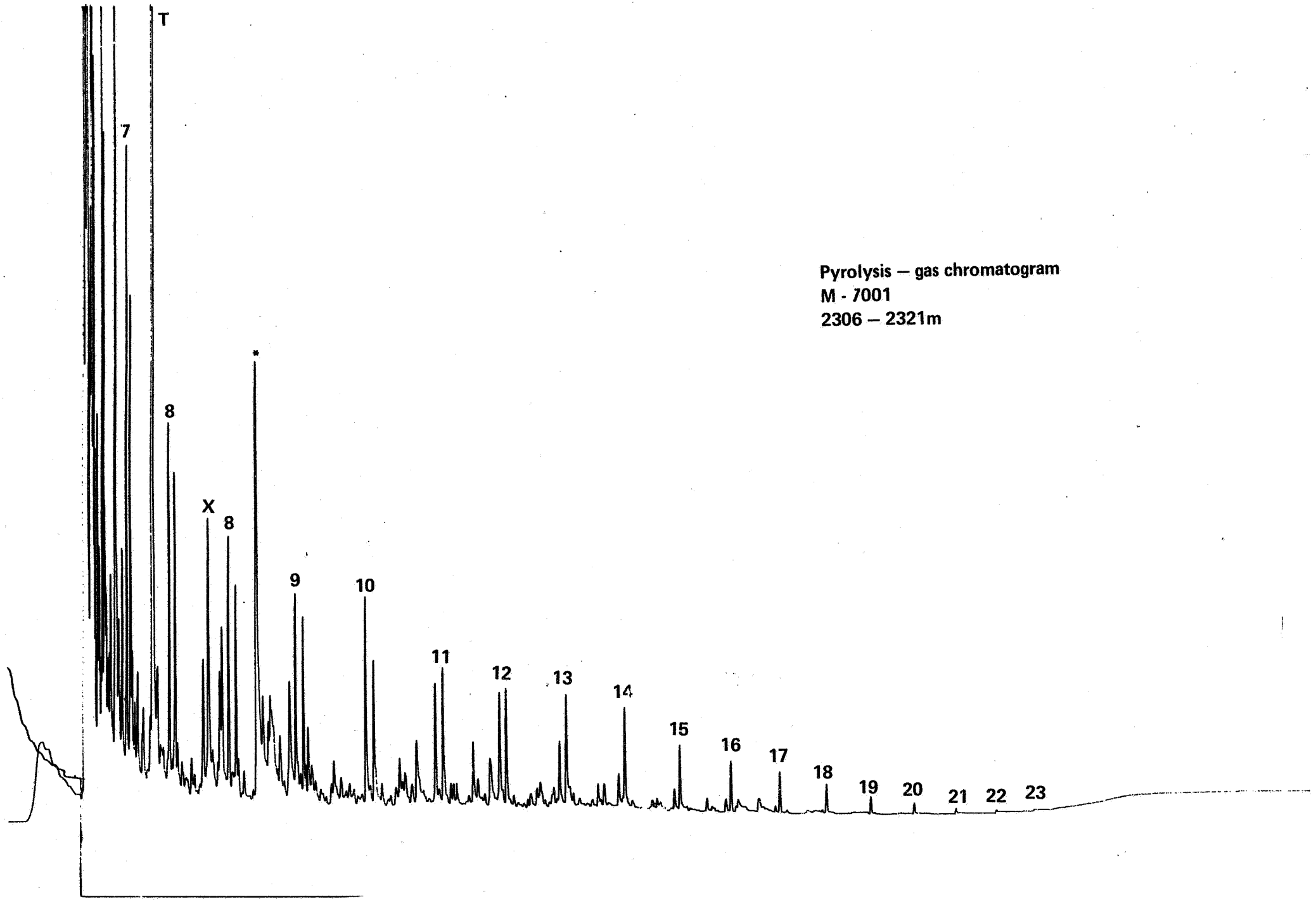




Pyrolysis — gas chromatogram
M - 7010
2441 — 2455m



Pyrolysis — gas chromatogram
M - 6998
2261 — 2276m



Pyrolysis – gas chromatogram
M - 7001
2306 – 2321m