

July 1982

RKER.82.104

GEOCHEMICAL ANALYSIS OF IMPREGNATED HYDROCARBONS  
IN CORES FROM WELLS HARGREAVES AND TITTENSOR,  
UNITED KINGDOM

by

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Investigation 9.12.486

With co-operation from Ms. A.H. Faber

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GEOCHEMICAL ANALYSIS OF IMPREGNATED HYDROCARBONS IN CORES  
FROM WELLS HARGREAVES AND TITTENSOR, UNITED KINGDOM

1. RESULTS AND DISCUSSION

Geochemical analysis has been carried out of two core samples from wells Hargreaves (794 m) and Tittensor (808.7 m) reported to contain impregnated hydrocarbons. Both cores are of Carboniferous age.

The results are shown in Table 1 and Figs. 1-7.

The results of the analysis indicate the following:

- 1.1 The extract/carbon ratios of both samples (Table 1) confirm that the cores contain impregnated hydrocarbons.

Maceral analyses of both cores (Figs. 6 and 7) shows that the Tittensor core at 808.9 m contains only impregnated hydrocarbons and no other macerals. Hargreaves core at 794 m contains only rare amounts of macerals plus abundant impregnated hydrocarbons.

- 1.2 The impregnated hydrocarbons are mature (gas chromatograms, Figs. 1 and 2; DOM of oil values 71 - these may be too high due to the presence of waxy material; fragmentograms, Figs. 4 and 5).
- 1.3 The impregnated hydrocarbons were originally derived from source rocks containing sapropelic organic matter ( $M_1$  and  $M_2$  parameters, Fig. 3) and waxy material (gas chromatograms, Figs. 1 and 2).

The sapropelic organic matter in the source rock of the Hargreaves impregnation appears to have had an algal origin ( $M_1$  and  $M_2$  parameters, Fig. 3). The waxy material in both impregnations appears to have had a land plant origin ( $C_{29}$  predominance of the steranes, including the rearranged variety, Figs. 4 and 5; odd-even predominance of the n-alkanes).

Slight differences in the organic matter composition of the source rocks of the two impregnations is indicated by differences in the carbon isotope values ( $-29.2$  and  $-27.6^{\circ}/\text{oo}$ ).

1.4 Core material lying close to the impregnated cores in both wells contain much land-plant derived-, and sapropelic, organic matter (Hargreaves at 858 and 863 m; Tittensor between 608 and 771 m). It is possible that the impregnated hydrocarbons were derived from source rocks within these Carboniferous intervals where maturity has been reached.

## 2. CONCLUSIONS

Cores from wells Hargreaves at 794 m and Tittensor at 808.7 m, United Kingdom, contain mature, impregnated hydrocarbons.

The Hargreaves impregnation was derived from a source rock which contained sapropelic organic matter (of possible algal origin) plus land-plant waxes. The Tittensor impregnation was derived from a source rock containing bacterial sapropelic organic matter and land-plant waxes. These slight differences in organic matter composition of the source rocks are in agreement with differences in carbon isotope values.

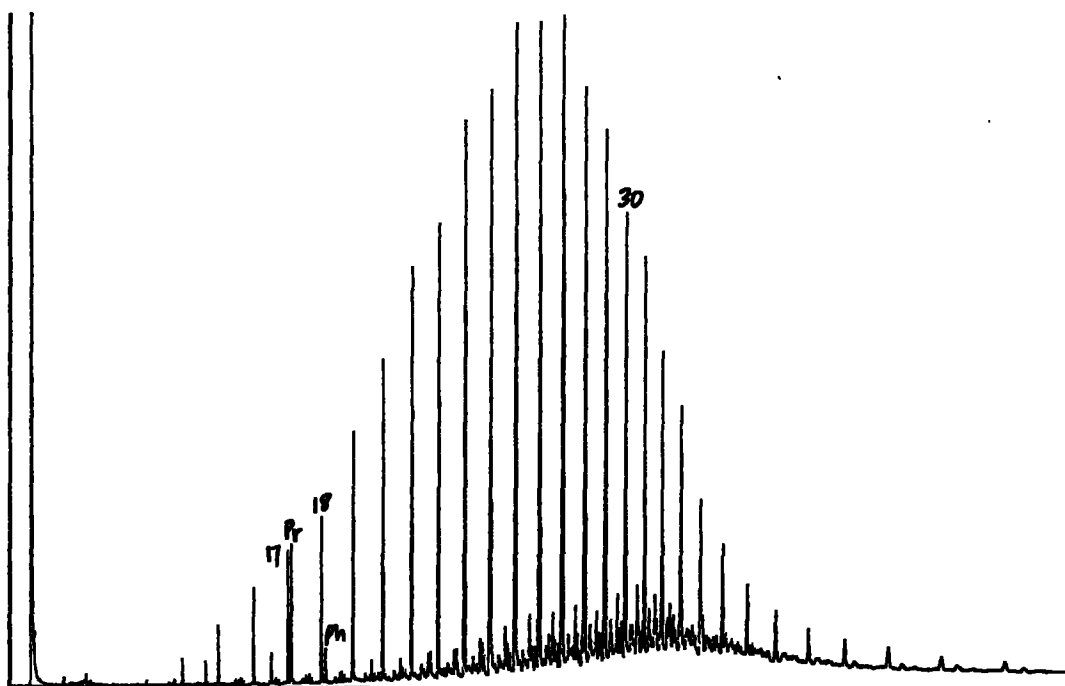
It is possible that the impregnated hydrocarbons were derived from mature, Carboniferous land-plant/S.O.M. containing source rocks which lie in the vicinity of the impregnated cores.

TABLE 1 - GEOCHEMICAL DATA OF ROCK EXTRACTS

	United Kingdom	
	Hargreaves	Tittensor
	794 m	808.7 m
	Core	Core
% ethyl acetate extract	0.04	0.03
% organic carbon after extraction	0.07	0.22
% sulphur	n.d.	n.d.
ppm V as metals	n.d.	n.d.
ppm Ni as metals		
pristane/phytane	3.8	3.0
pristane/nC17	1.2	0.5
phytane/nC18	0.2	0.1
Parameter M <sub>1</sub>		
A	47	64
B	39	23
C	14	13
Parameter M <sub>2</sub>		
P	22	29
Q	38	45
R	40	26
DOM of oil	71	71
* % saturates	73	58
% aromatics	19	20
% heterocompounds	8	22
$\delta^{13}\text{C}^{\text{o}}/\text{oo}$	-29.2	-27.6
extract/carbon	0.57	0.14

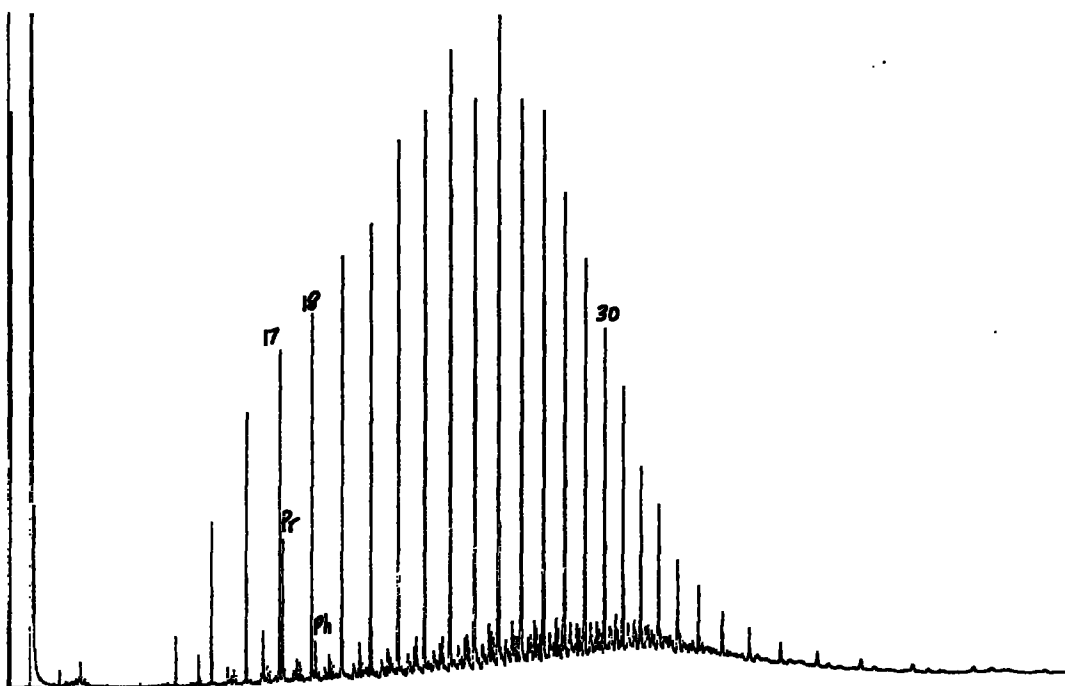
\* Determined by thin layer chromatography.

n.d. = not enough material for the determination



GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

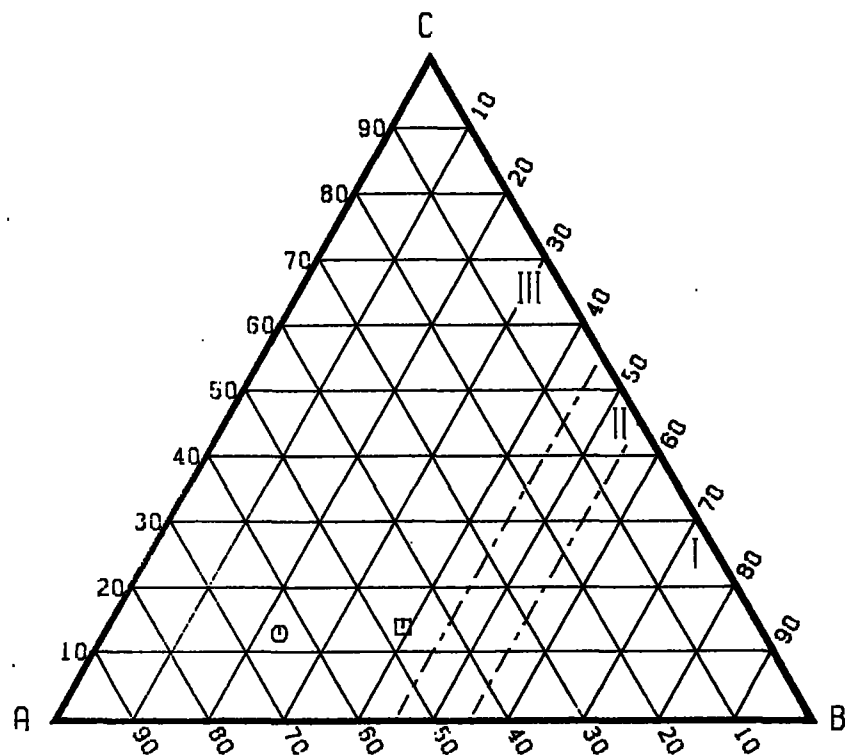
FIG. 1. HARGREAVES. 794M



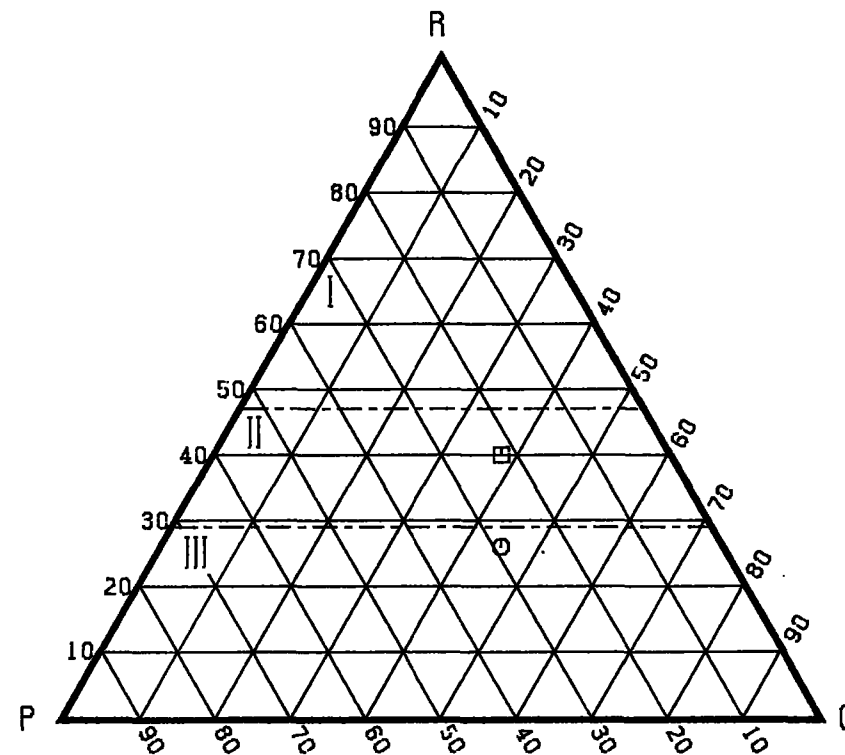
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

FIG. 2. TITTENSOR 808.7M

PARAMETER M1



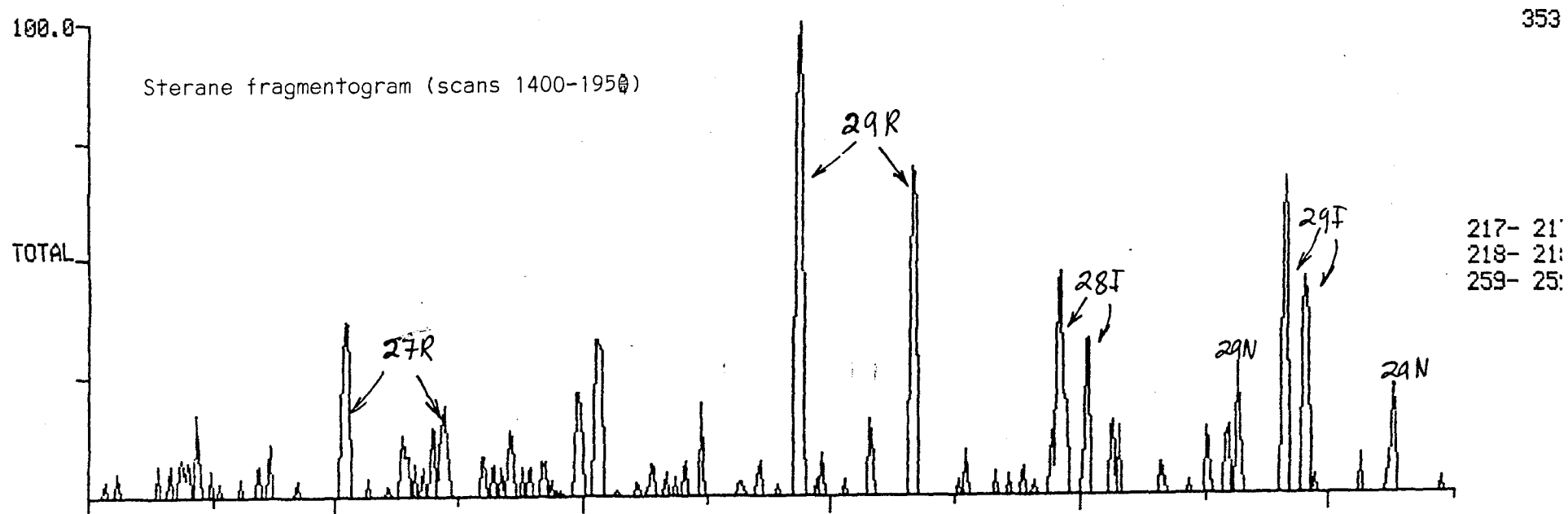
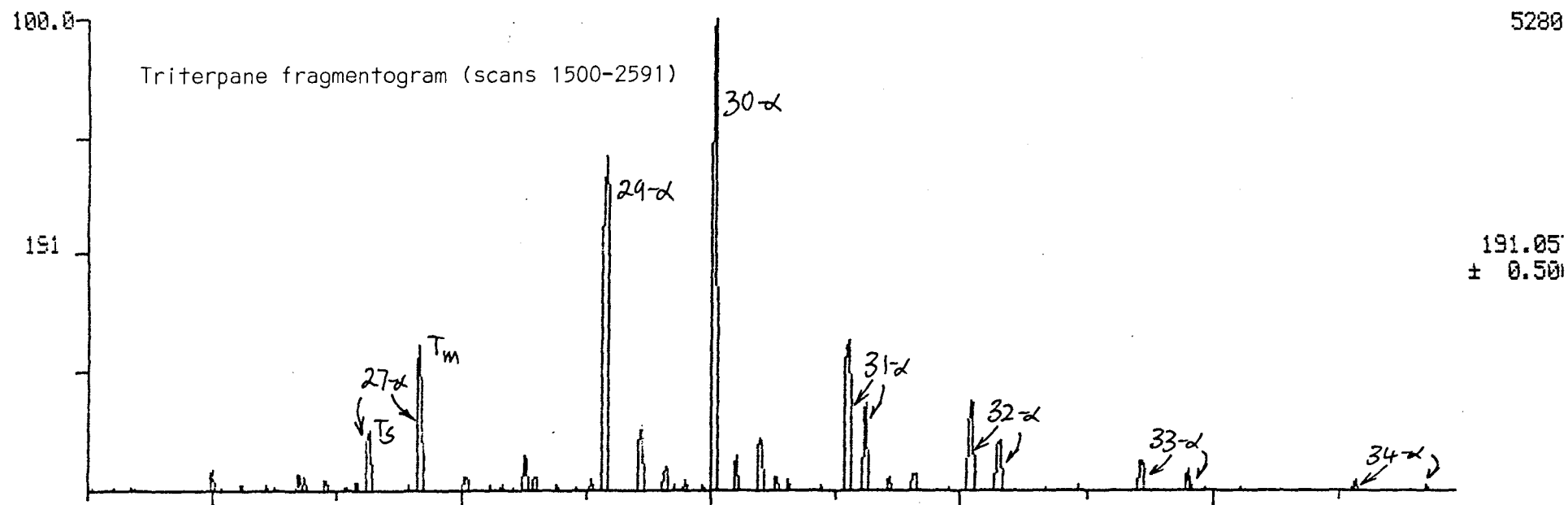
PARAMETER M2



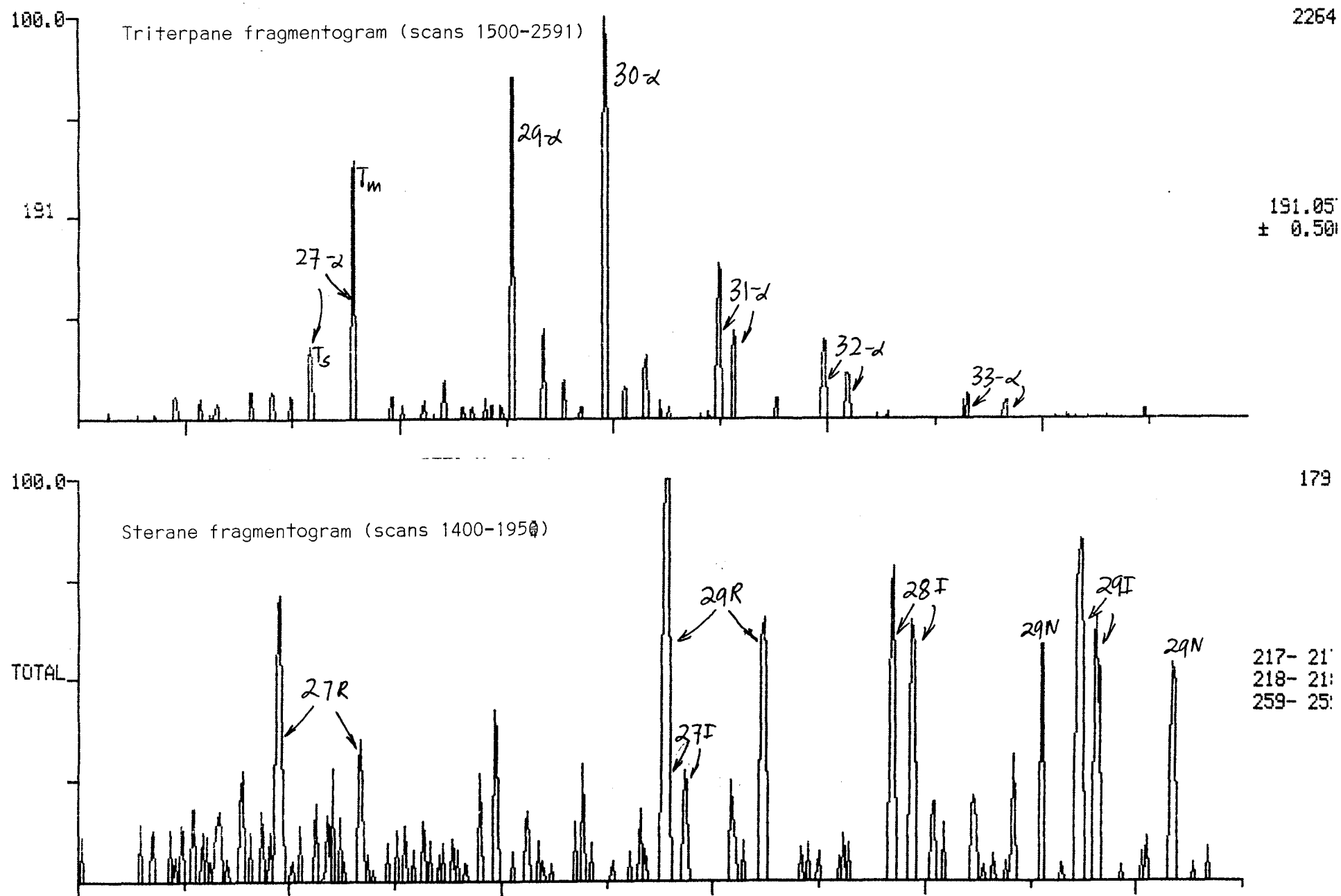
- I LANDPLANT-DERIVED CRUDES WITH SUBSTANTIAL RESIN CONTRIBUTION TO SOURCE MATTER
- II CRUDES OF MIXED ORIGIN
- III CRUDES DERIVED FROM SOM AND/OR ALGAL MATTER

LEGEND

□ - HARGREAVES 794 M  
 ○ - TITTENSOR 808.7 M







PAGE : 1

**FITTENSON**

Fig. 6

L E G E N D	
*	ABUNDANT
+	COMMON
/	FEW
-	RARE

# MACERAL DESCRIPTION OF 4 SAMPLES FROM WELL HARGREAVES

DEPTH IN M	SAMPLE TYPE
---------------	----------------

781.2	CORE
794.0	CORE
858.0	CORE
863.0	CORE

SAPROPALEIC ORG. MATTER	ORGANIC															INORG.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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	TELOCELLINITE	TELINITE	DESMOCELLINITE	SPORINITE	CUTINITE	RESINITE	LIPTODETRINITE	BOTRYOCOCCLUS	TASMANITES	OTHER ALGAE	MICROPLANKTON	EXSUDATINITE	SCLERACTINITE	FUSINITE	MACRINITE					MICRINITE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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L E G E N D	
*	ABUNDANT
+	COMMON
/	FEW
-	RARE

Fig. 7

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