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

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Investigation 9.12.486

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RIJSWIJK, THE NETHERLANDS

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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 -27.6⁰/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.

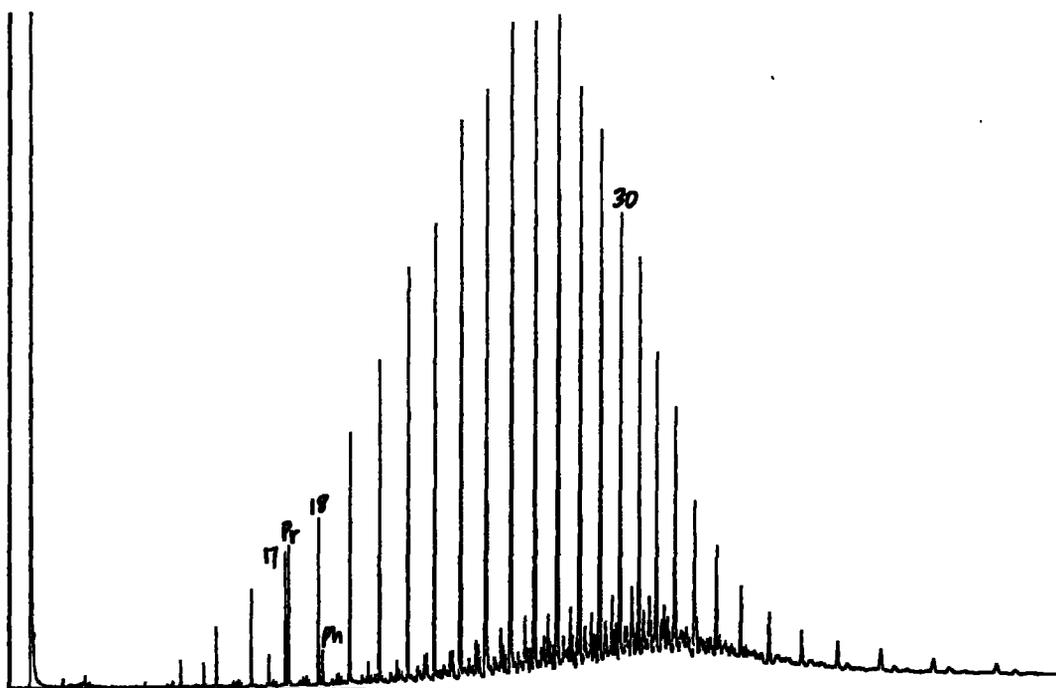
It is possible that the impregnated hydrocarbons were derived from mature, Carboniferous land-plant/S.O.M. containing source rocks which lie in the vicinity of the impregnated cores.

TABLE 1 - GEOCHEMICAL DATA OF ROCK EXTRACTS

	United Kingdom	
	Hargreaves 794 m Core	Tittensor 808.7 m 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 ₁		
A	47	64
B	39	23
C	14	13
Parameter M ₂		
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

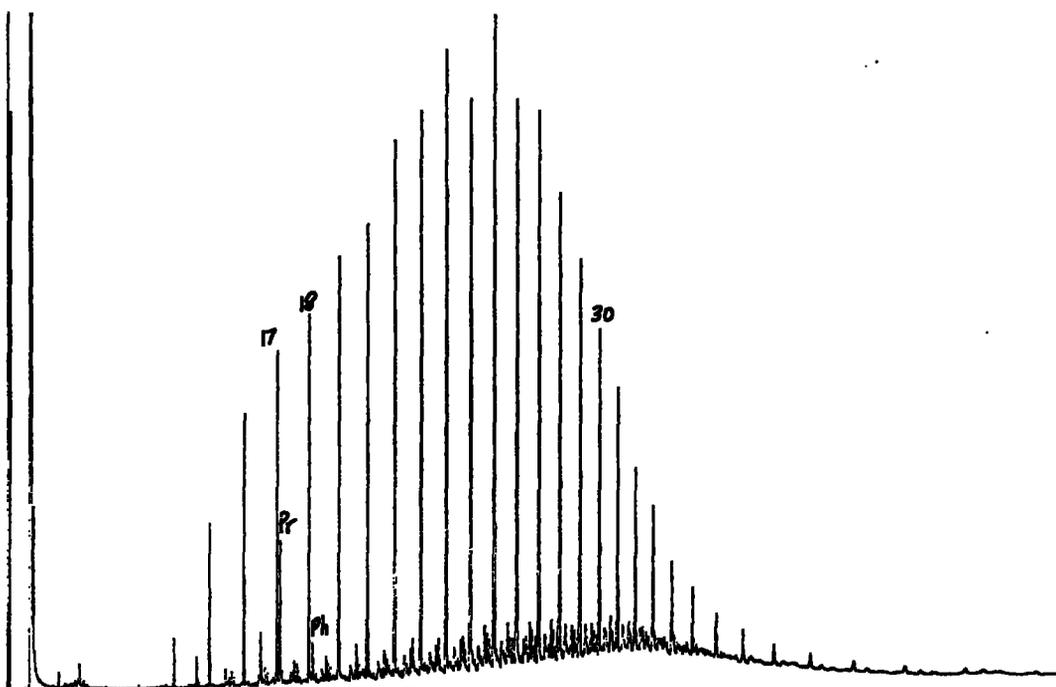
* Determined by thin layer chromatography.

n.d. = not enough material for the determination



GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

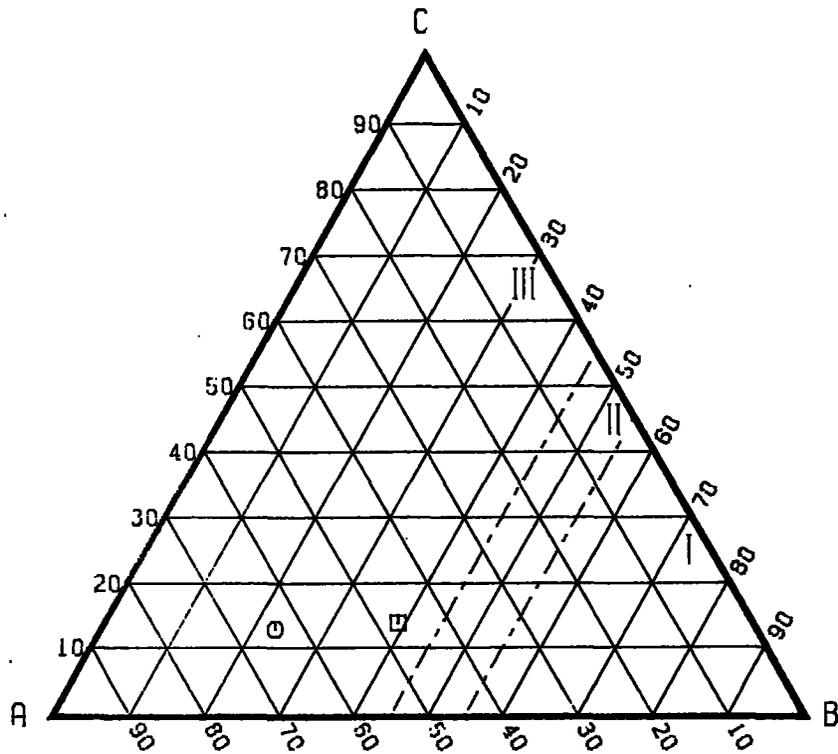
FIG. 1. HARGREAVES. 794M



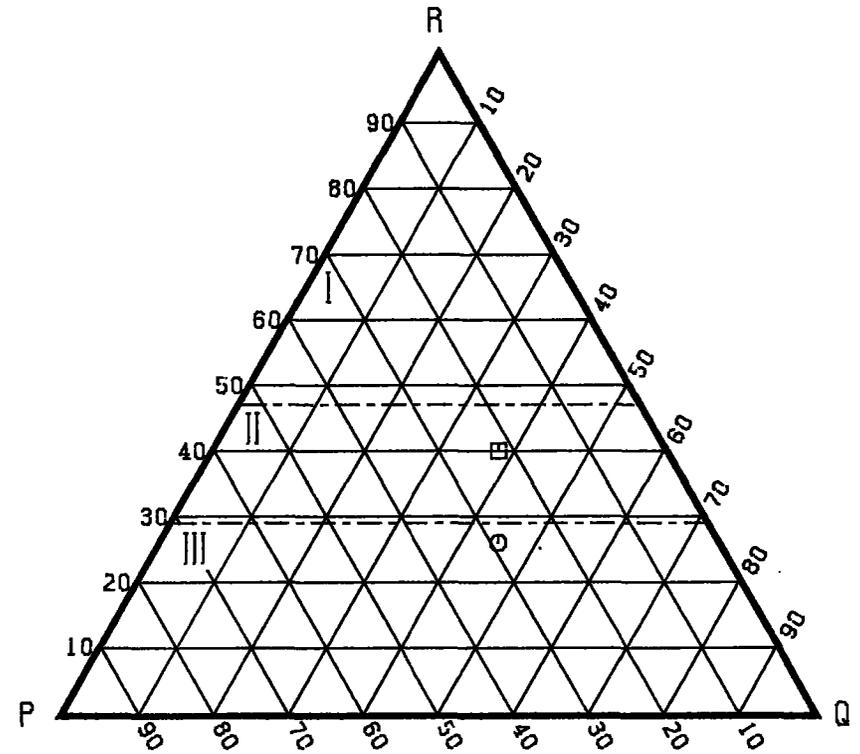
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

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

FIG. 3

GC-MS analysis HARGREAVES 794 m

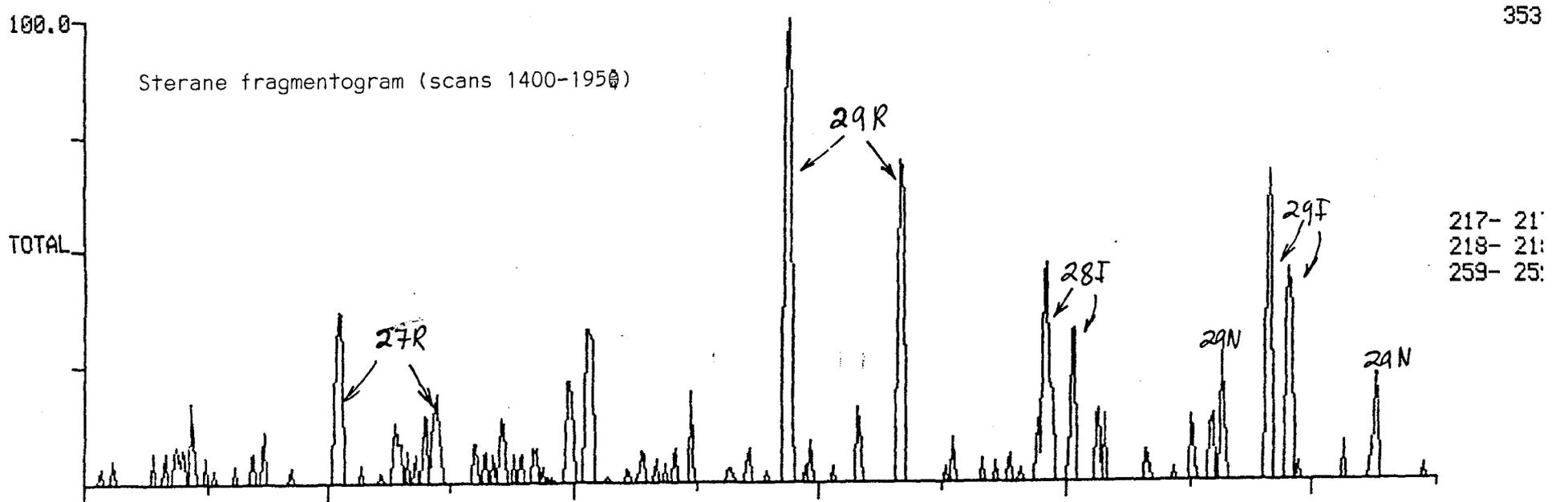
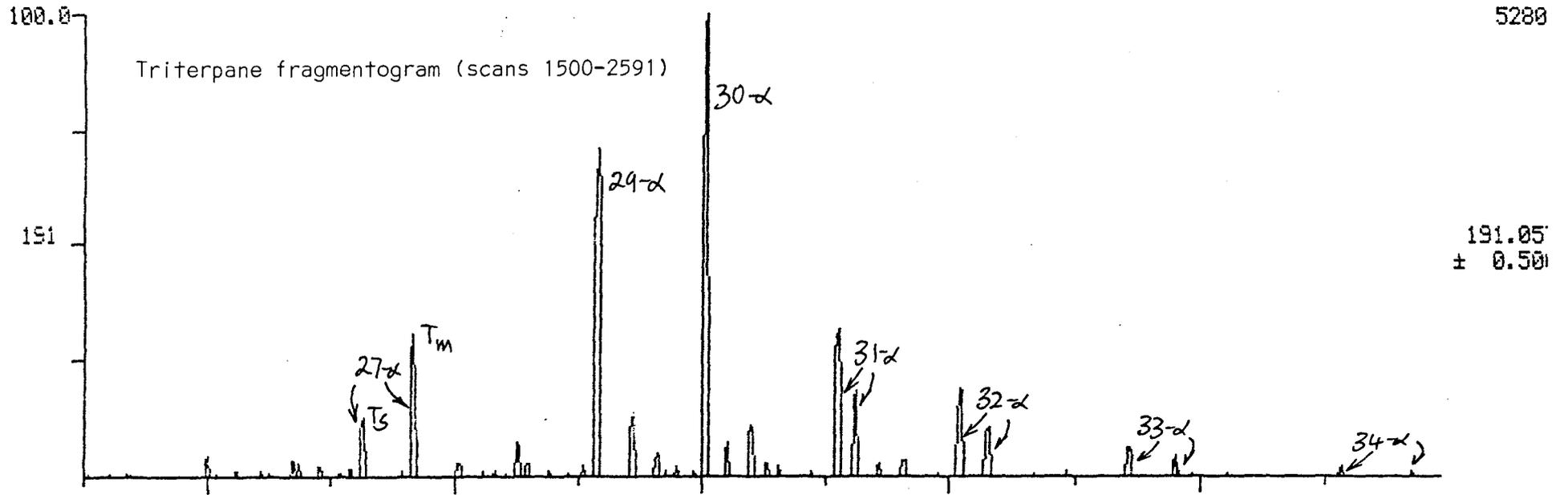
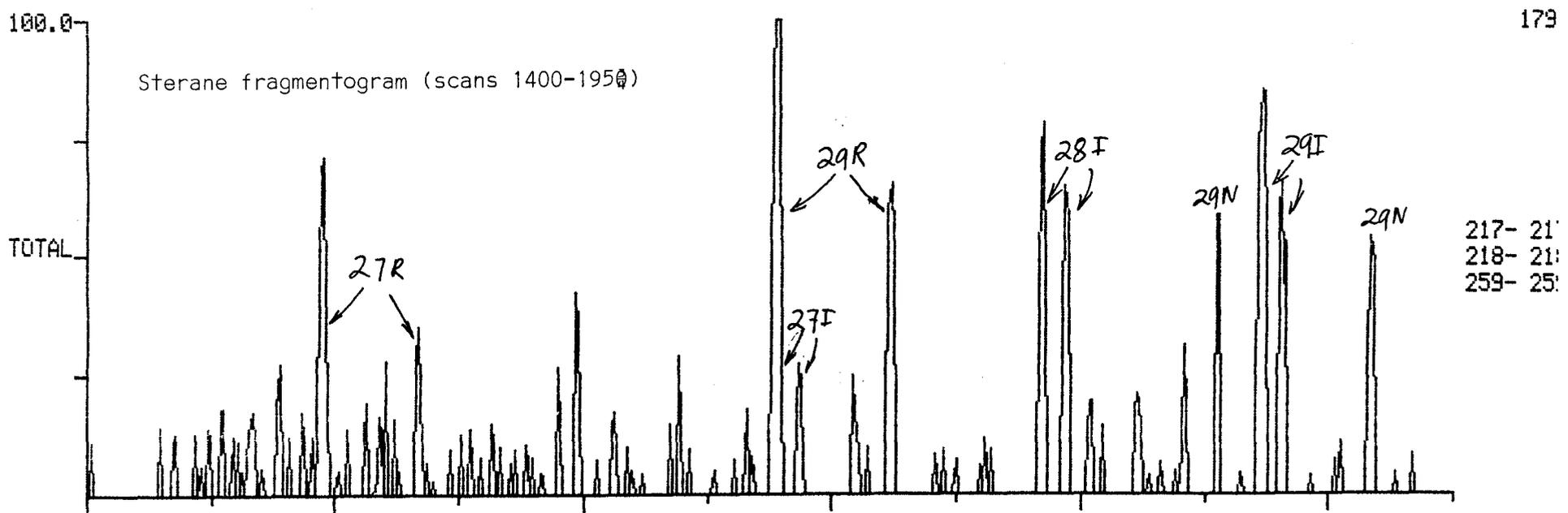
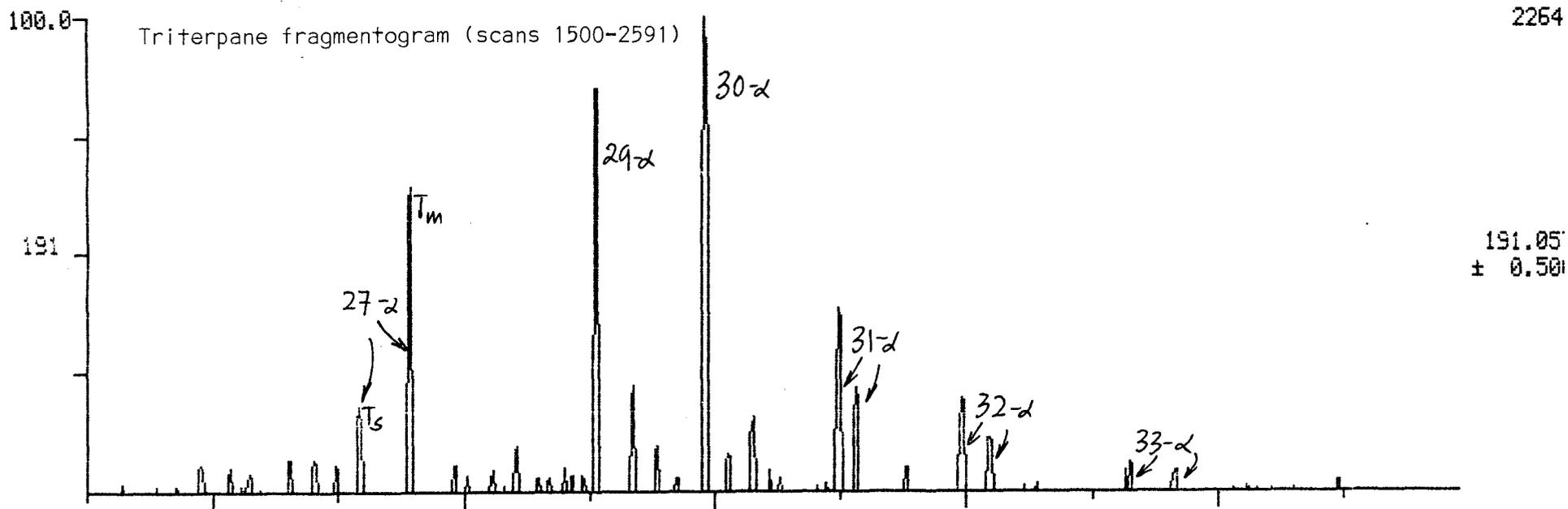


Fig. 4



MACERAL DESCRIPTION OF 6 SAMPLES FROM WELL TITTENSOR

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

608.2	CORE
613.5	CORE
621.3	CORE
622.7	CORE
771.0	CORE
808.9	CORE

SAPROPALIC ORG. MATTER	ORGANIC											INORG.		
	VITR.	LIPTINITE							INERT.					
							ALGAE							
TELOCOLLINITE														
TELINITE														
DESMACOLLINITE														
SOPRINITE														
CUTINITE														
RESINITE														
LIPTODETRINITE														
BOTRYOCOCCUS														
TASMANITES														
OTHER ALGAE														
MICROPLANKTON														
EXSUDATINITE														
SCLEROTINITE														
FUSINITE														
MACRINITE														
MICRINITE														
UNDEFINED MINERALS														
FRAMBOIDAL PYRITE														
AGGREGATES OF PYRITE														
CRYSTALS OF PYRITE														

*		/	+			+	+				/	*	*	-	-	/
/		/	+			+	/				/	+	*	-	-	/
*		/	+			+	+				/	*	*	-	-	/
*	*	*	/	-	/	/			/		+	-	-	-	-	-
*	*	*	+	-	/	+			-	-	/	/	-	-	-	-
									/			*				

LEGEND	
*	: 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

	ORGANIC											INORG.			
	VITR.	LIPTINITE						INERT.							
						ALGAE									
SAPROPALEIC ORG. MATTER															
TELLOLLINITE															
TELINITE															
DESMOCELLINITE															
SPORINITE															
CUTINITE															
RESINITE															
LIPTODETRINITE															
BOTRYCOCOCCUS															
TASMANITES															
OTHER ALGAE															
MICROPLANKTON															
EXSUDATINITE															
SCLEROTINITE															
FUSINITE															
MACRINITE															
MICRINITE															
UNDEFINED MINERALS															
FRAMBOIDAL PYRITE															
AGGREGATES OF PYRITE															
CRYSTALS OF PYRITE															

+		/	+	-	+	/					+	+	*	-	-	/
-		-							*				*	-	-	-
	+	*	+	/	/	+	-		/	*		+	-	/	-	/
*		/	+	-	+	/				+	*	*	/	-	-	/

LEGEND	
*	: ABUNDANT
+	: COMMON
/	: FEW
-	: RARE

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