

EP/P/EXP/GDP 93-040 RP

Pau, june 1993

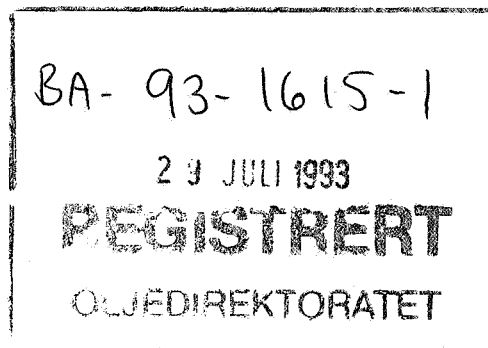
Order nr 510398411

WELL 1/3-6

(NORWAY)

**Organic Geochemical Study
of DST Fluids and Reservoir Rock Extracts**

EP/P/EXP/GDP 93-040 RP



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Country NO
1/3-6

Identification HT DST2
2913 2953 m
(Lab. Ref. B44605)

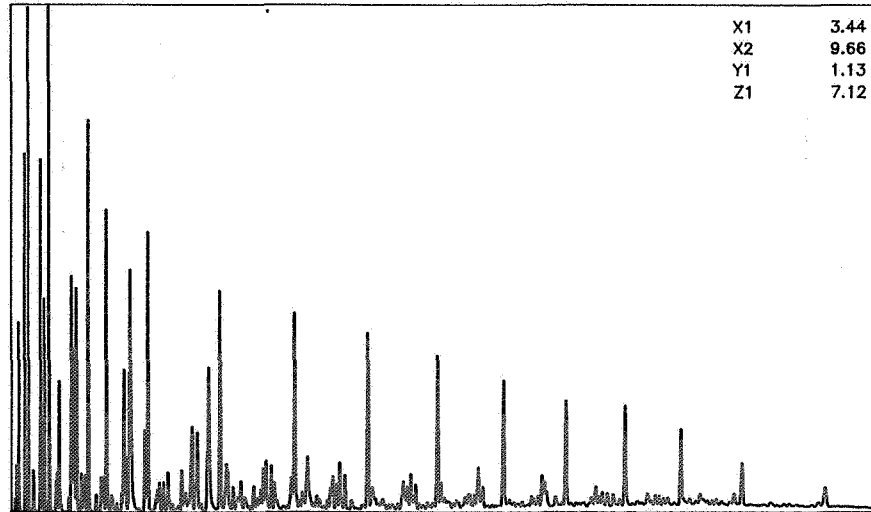
spe. gra. 15C .7784
d API 50.47
Sulphur (%) .18

d13C HT -27.8
d13C RD -28.5
d13C SAT -28.5
d13C ARO -27.5

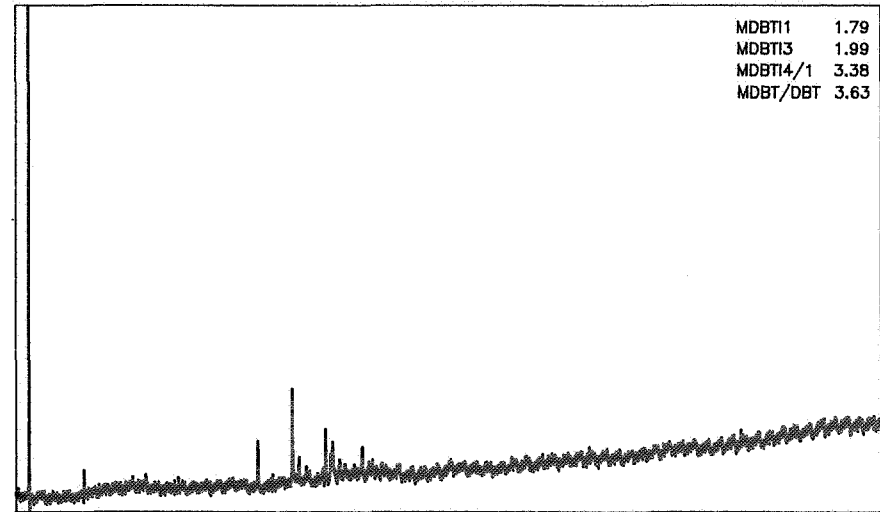
Distillate	56.41	(% HT)	
HC SAT [C14+]	34.24	(% HT)	78.55 (% RD)
HC ARO [C14+]	7.97	(% HT)	18.28 (% RD)
Resins	1.38	(% HT)	3.16 (% RD)
Asphaltenes	0.00	(% HT)	0.00 (% RD)
SAT/ARO	4.30		

INTERPRETATION

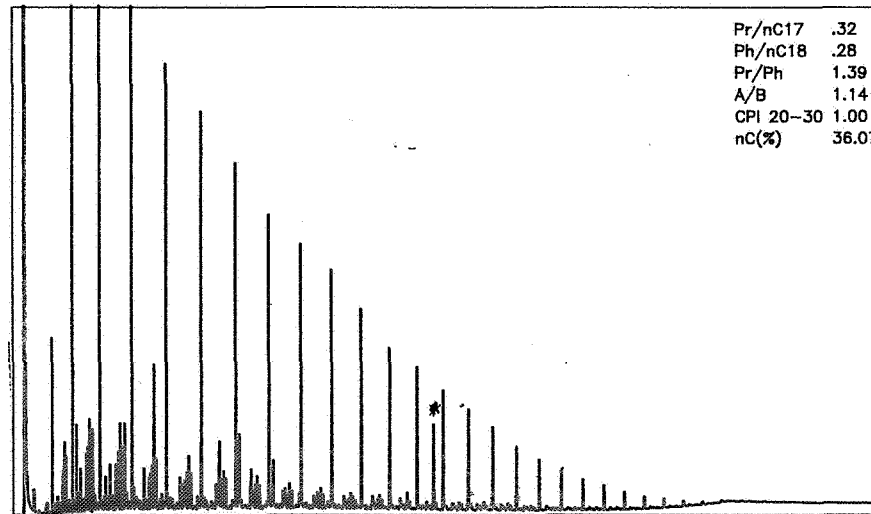
Biodegradation: Unnoticed - Washing: Unnoticed - Maturity Eq VRo %: 0.8/1.0 - Source Rock Probable of Age J



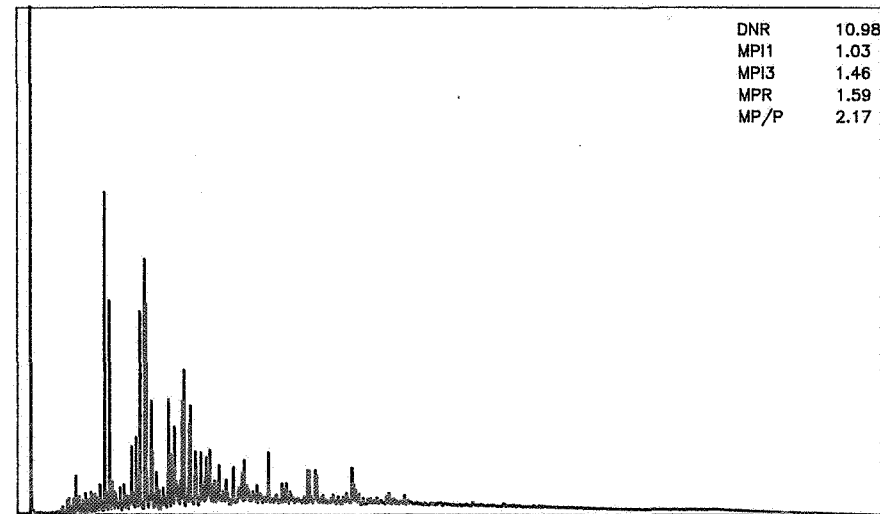
THERMOVAPORISED HC



SULFUR COMPOUNDS



SATURATED HC



AROMATIC HC

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elf aquitaine

Fig.4

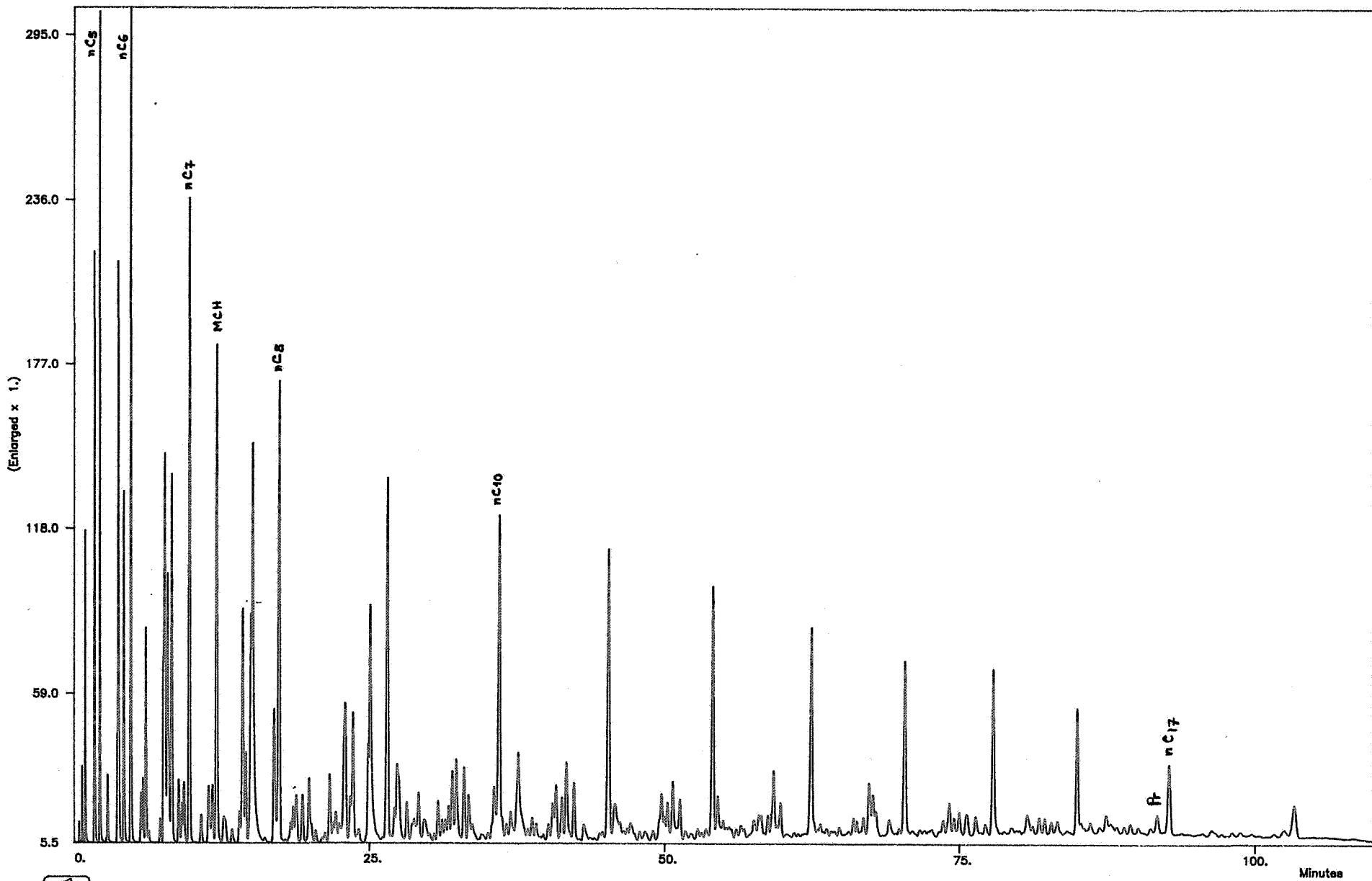
NO

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CHROMATOGRAMME "HC THERMOVAPORISES" / CHROMATOGRAM "THERMOVAPORISED HC"

Fig.5

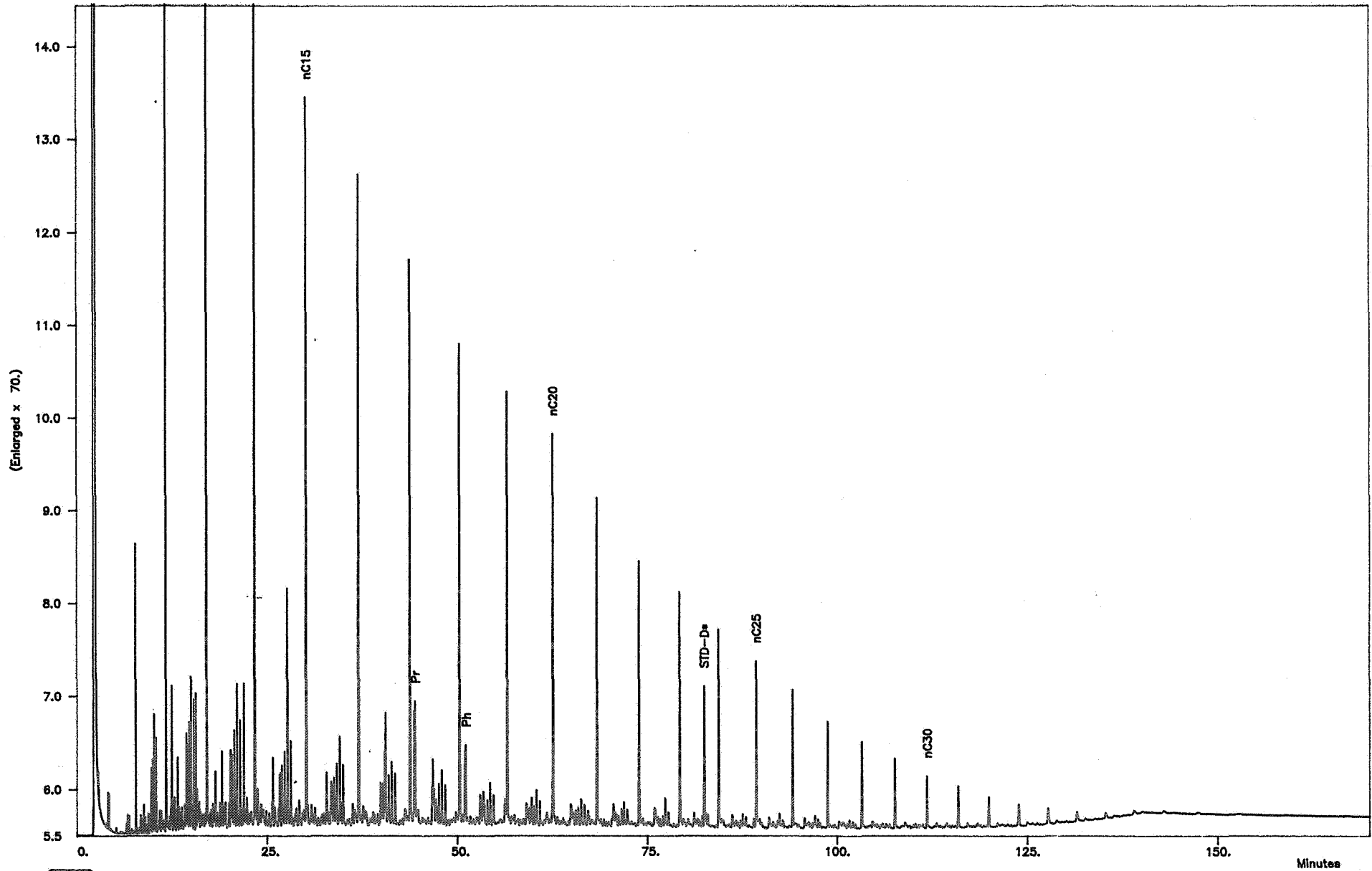
NO

1/3-6

HT DST2

2913 2953 m

(Lab. Ref. B44605)



CHROMATOGRAMME "HC SATURES" / CHROMATOGRAM "SATURATED HC"

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Fig.6

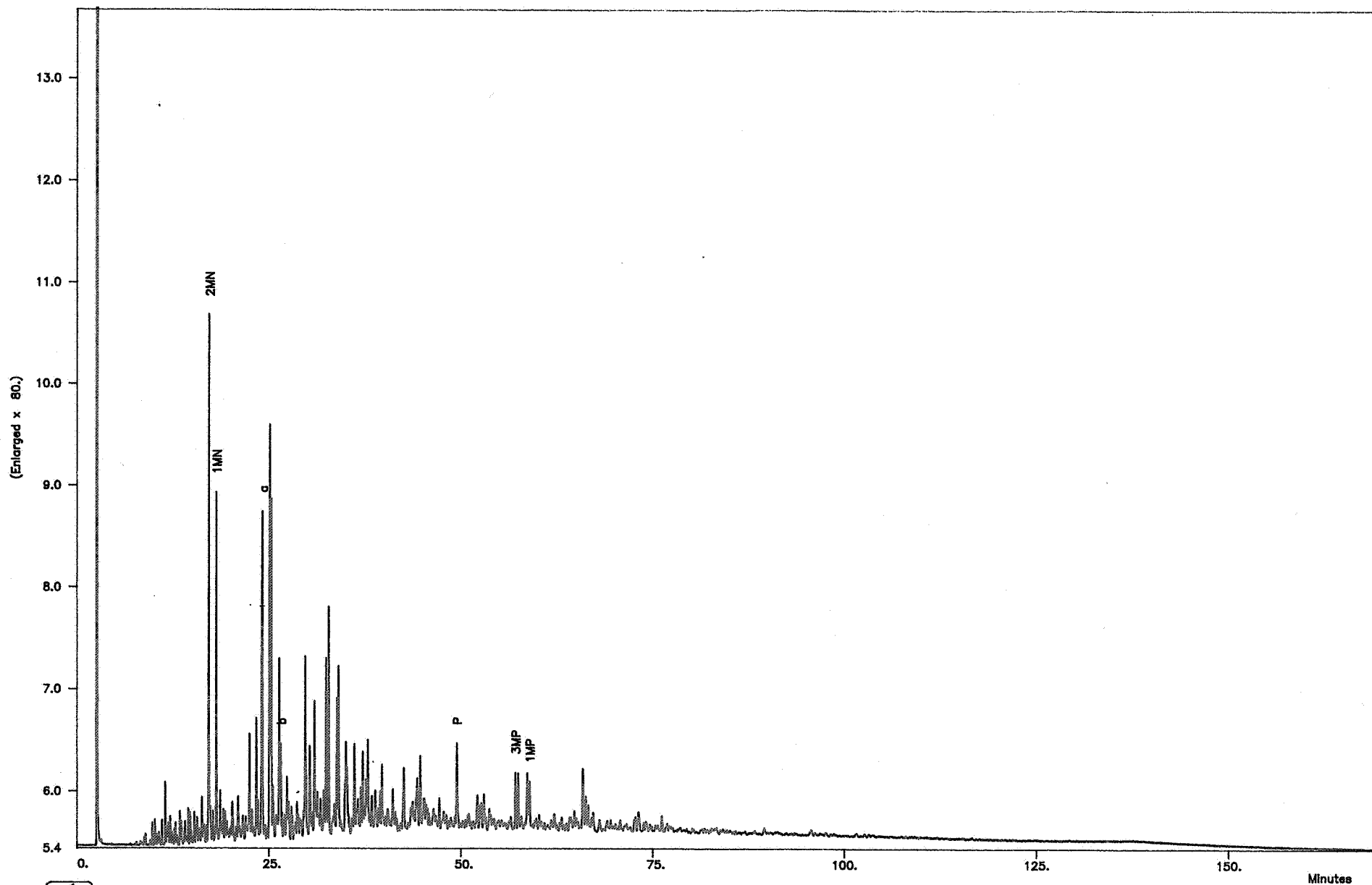
NO

1/3-6

HT DST2

2913 2953 m

(Lab. Ref. B44605)



CHROMATOGRAMME "HC AROMATIQUES" / CHROMATOGRAM "AROMATIC HC"

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elf aquitaine

Fig. 7

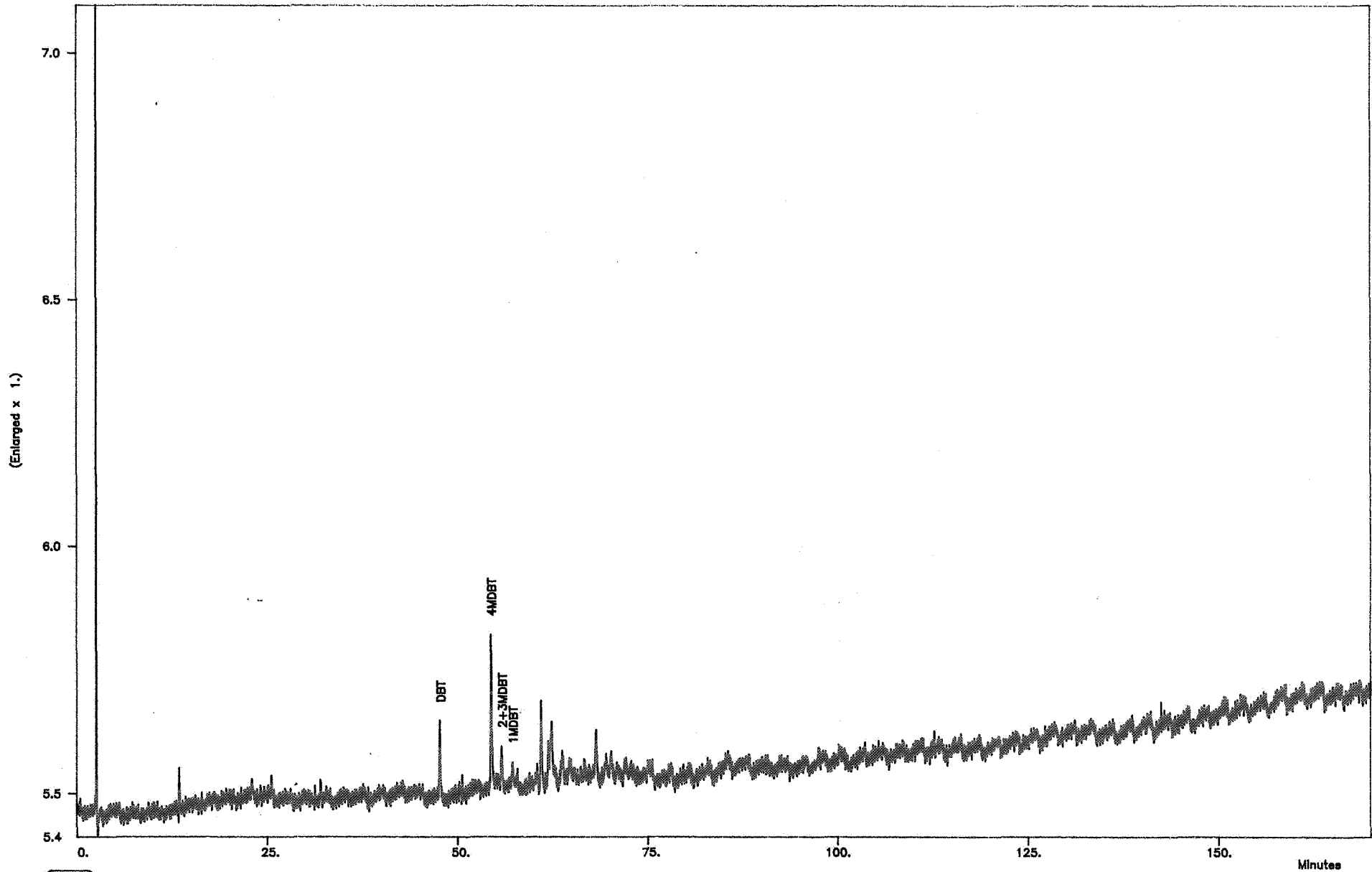
NO

1/3-6

HT DST2

2913 2953 m

(Lab. Ref. B44605)



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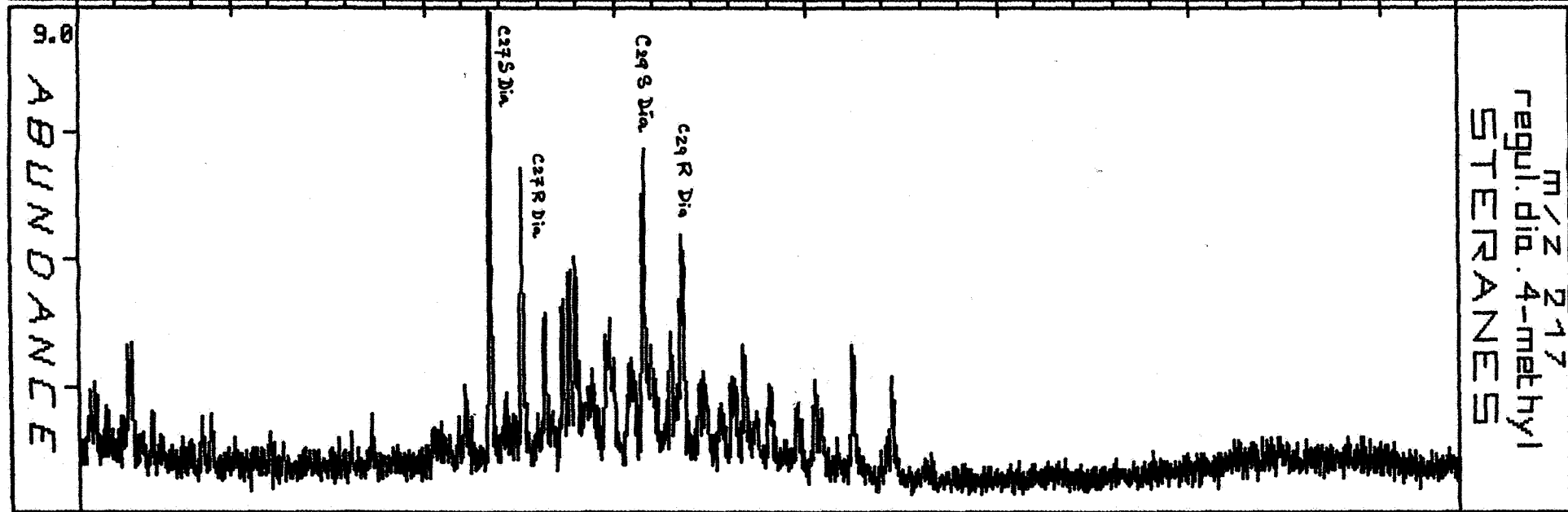
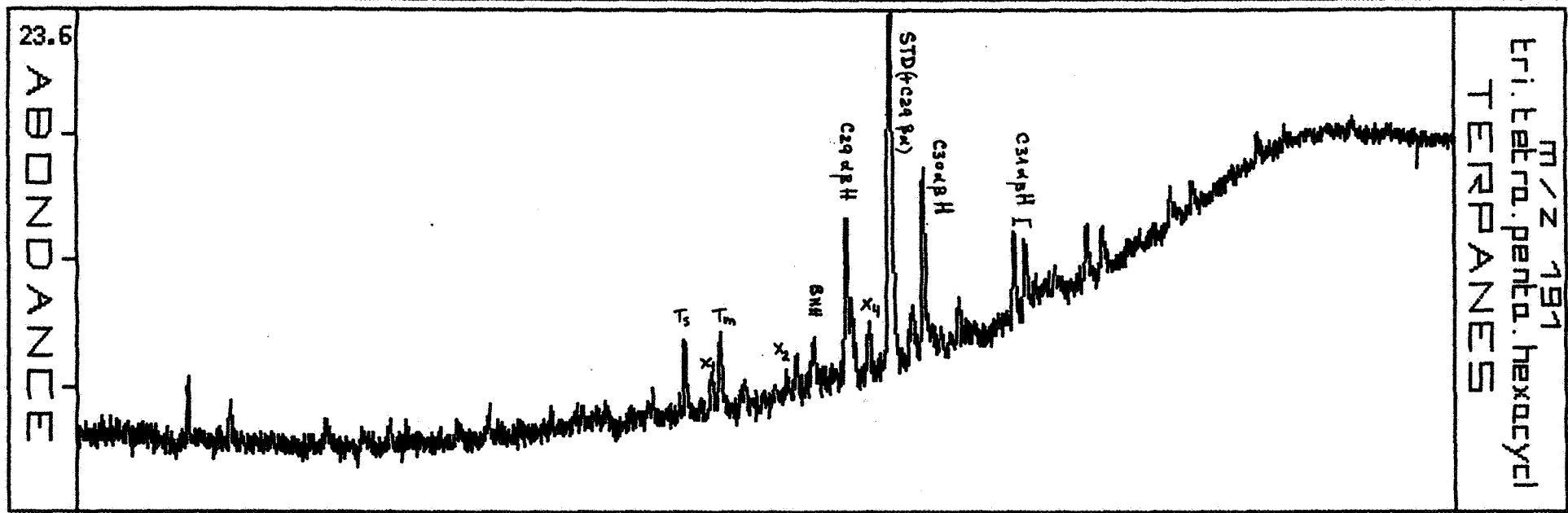


elf aquitaine

CHROMATOGRAMME "COMPOSES SOUFRES" / CHROMATOGRAM "SULFUR COMPOUNDS"

Fig.8

PAYS / COUNTRY NO	SONDAGE / WELL 1/3-6	IDENTIFICATION HT-D5T2 LABSAM NR : B44605ST	COTE / DEPTH 2913.2953. M
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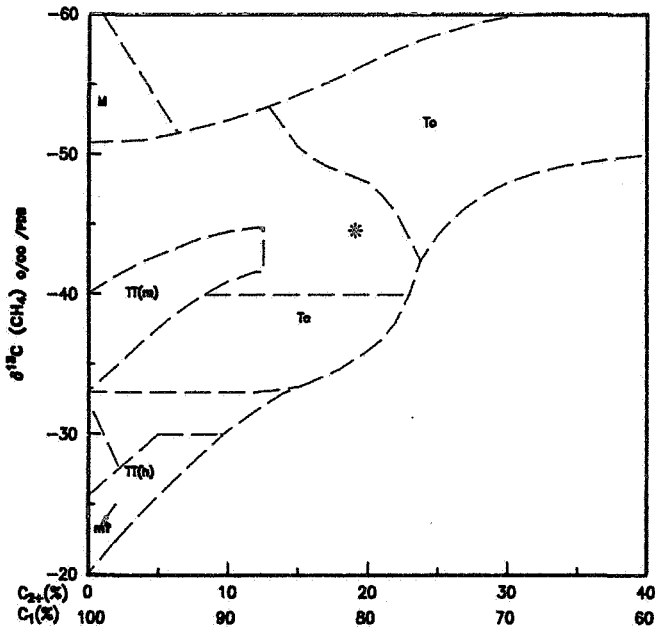


TEMPS DE RETENTION CROISSANT - INCREASING RETENTION TIME (MN)

Fig.9

GAS ISOTOPES DIAGRAMS

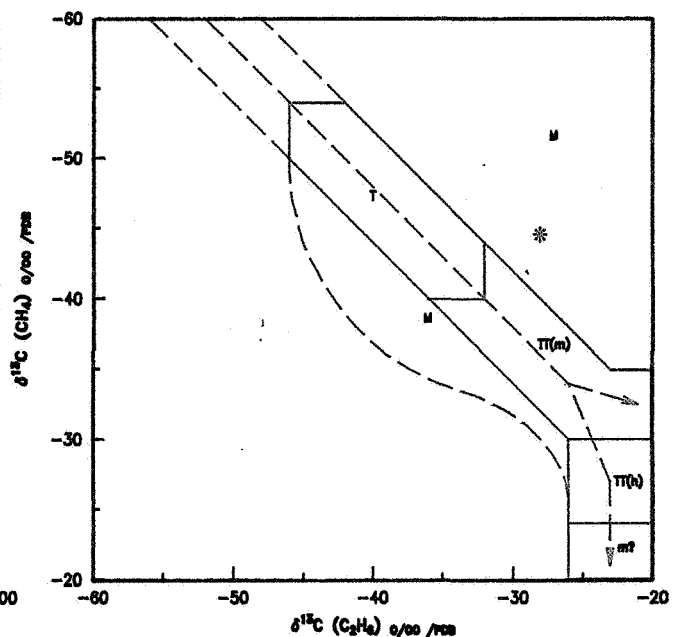
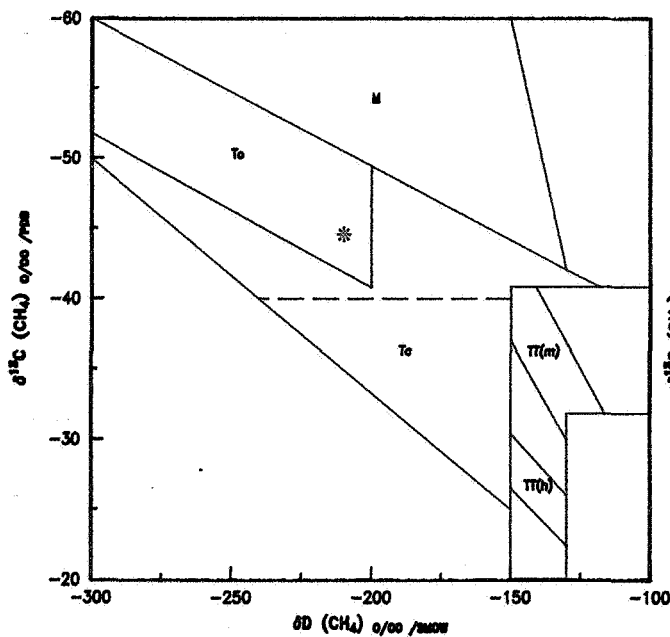
1/3-6 (DST2)



After M. SCHOELL, 1983, AAPG Bull. 67 p 2225-2238

- T = gas generated within the oil window
- To = gas associated with oil generation
- To = gas associated with condensate generation
- TT = dry gas generated beyond oil window
- TT(m) = from sapropelic liptinitic O.M.
- TT(h) = from humic O.M.
- m = Migration
- M = Mixed gas

REMARK : TT(h) must be related to coal gases from Northwestern GERMANY CARBONIFEROUS series. According to our experience gases from other humic source rocks take place in T or TT(m) zone.



TABLEAUX

RESULTS OF CONDENSATE AND GAS ANALYSIS
1/3-6

IDENTIFICATION			
Sample		DST 2	
Lab reference		B44605	
RESERVOIR			
Depth (m)		2913-2953	
Age		Paleocene	
Formation		Cod	
Lithology		Sandstone	
CONDENSATE		GAS	
BULK PROPERTIES		COMPOSITION	
specific gravit	.7784	N2	.85
API gravity	50.47	CO2	1.31
sulfur %	.18	C1	78.50
residue C14+ %	43.59	C2	10.95
CARBON ISOTOPES		C3	5.11
total oil	-27.8	iC4	.96
residue C14+	-28.5	nC4	1.46
saturates C14+	-28.5	iC5	.43
aromatics C14+	-27.5	nC5	.34
resins	-27.3	C6+	~
COMPOSITION OF RESIDUE C14+		MOLECULAR RATIOS	
% saturated HC	78.55	iC4/nC4	.66
% aromatic HC	18.28	C1/C1-C4 (%)	80.94
% resins	3.16	C1/C2-C3	4.89
% asphaltenes	.00	ISOTOPES	
% total HC	96.83	d13C C1	-44.6
sat/aro	4.30	d13C C2	-28.1
COMPOSITION OF WHOLE OIL		d13C C3	-26.0
distillate %	56.41	d13C C4	~
saturated HC C14+	34.24	d13C CO2	-7.6
aromatic HC C14+	7.97	dD C1	-210.0
resins	1.38	d18O CO2	+31.0
asphaltenes	.00		
GAS CHROMATOGRAPHY			
n-C6/MCP	3.44		
n-C7/DMCP	9.66		
Pr/Ph	1.39		
Pr/nC17 = A	.32		
Ph/nC18 = B	.28		
A/B	1.14		
CPI (C20-C30)	1.00		
n-alkanes (%)	36.07		
DNR	10.98		
MPI 1	1.03		
MPI 3	1.46		
MP/P	2.17		
MPR	1.59		
MDBT 1	1.79		
MDBT 3	1.99		

S N E A (P) Organic Geochemistry
 Computerized GC/MS Analytical Report on Steranes and Terpanes nr. 2522

Sample..... : 1/3-6 B44605. ST NO
 Well Depth..... : 2913. to 2953. (Meters)
 Sample type..... : /
 Acquisition File Name : B44605STMQ Mag tape /
 Submitted by..... : KT august 31. , 1992.
 Comments..... : HT-DST2

S T E R A N E S		Areas	T E R P A N E S		Areas
C21	Sterane.....	1698.	C23	tricyclic.....	2060.
C22	4-Methyl Sterane	nd	C24	tetracyclic.....	nd
C22	Sterane.....	799.	Ts.....		4315.
C27	S Diasterane.....	7192.	Tm.....		4675.
C27	aa S Sterane.....	1693.	29	ab Hopane.....	9350.
C27	bb R Sterane.....	1799.	30	ab Hopane.....	10608.
C27	bb S Sterane.....	1799.	30	ba Hopane.....	2157.
C27	aa R Sterane.....	2117.	31	ab S Homohopane..	3955.
C29	aa S Sterane.....	1019.	31	ab R Homohopane..	3236.
C29	bb R Sterane.....	1478.	32	ab S Homohopane..	2517.
C29	bb S Sterane.....	1070.	32	ab R Homohopane..	1798.
C29	aa R Sterane.....	2243.	TOTAL	TERPANES	129682.
TOTAL STERANES		123176.			

OPTIONAL ANALYSIS		Areas	OPTIONAL ANALYSIS		Areas
C30	tricyclic, 22 S..	ns	C35	ab S Homohopane.	nd
C30	tricyclic, 22 R..	ns	C35	ab R Homohopane.	nd
29	Desmethyl Hopane.	ns			
C28	Bisnorhopane....	ns			
C29	18 a(H) Hopane..	4315.	"X"		2618.
18	a(H) Oleanane ...	nd	nC31		392125.
Gammacerane (C30)...		ns	C27bb		3600.
C33	ab S Homohopane.	1438.	C28bb		2569.
C33	ab R Homohopane.	1078.	C29bb		2548.
C35	Hexacyclic.....	ns			

RESULTS :

27	bb S / 27	aa R ..	0.84	C29	DHop / C29 Hop	v. low.
27	aa S / 27	aa R --	0.79	C28	BNHop / C29 Hop-	v. low.
27	S dia / 27	aa R	3.39	C29/5	/ C29 Hop....	0.46
22	4-Me st / 27	aa R	N / A	18	aH Olean/C30 Hop.	N / A
%	20 S C27		47.13	Gammacerane/C30	Hop.	v. low.
%	bb C27		48.56	30/3(R&S) / C29	Hop-	v. low.
29	bb S / 29	aa R...	0.47	30/3(R&S) / 23/3...		v. low.
29	aa S / 29	aa R...	0.45	2.35Hex/C35Hop	(R&S).	N / A
27	S dia / 29	aa R..	3.20	C35H(R&S)/C33H	(R&S).	N / A
22	4-Me st / 29	aa R	N / A	29+30Hop/C35	H(R&S).	N / A
%	20 S C29		35.95			
%	bb C29		43.85			
21	st / 22	st	2.12			
22	4-Me st / 22	st--	N / A			
29	H / C30	H	0.88	X/29H		0.28
Tm / Ts			1.08	nC31/C30H		36.96
23/3	/ 24/4		N / A	%nC31/100		0.60
%	22 S C31		54.99	%ST/100		0.19
%	22 S C32		58.32	%TT/100		0.20
ba / ab	----- X 100 -		20.33	%27bb/100		0.41
				%28bb/100		0.29
				%29bb/100		0.29
23/3	/ 21 st		1.21	27-30H/29ST		4.98
TT / ST			1.05	29bbR/29aaR		0.65

S N E A (P) Organic Geochemistry
Computerized GC/MS Analytical Report on Steranes and Terpanes nr. 2522

Sample..... : 1/3-6 B44605. ST NO
Well Depth..... : 2913. to 2953. (Meters)
Sample type..... : /
Acquisition File Name : B44605STMG Mag tape /
Submitted by..... : KT august 31. , 1992.
Comments..... : HT-DST2

QUANTITATIVE ANALYSIS OF STERANES AND TERPANES :

AREA d2-C29ba Hopane (linearized) : 94868. ; 100.00 nanograms
AREA d4-Ethylcholestane..... : 142696. ; 44.00 nanograms
Amount of residual saturated hydrocarbon fraction (mg)..... : 76.90
Amount of mixture used for quantitation (micrograms)..... : 95.95
% of saturated HC in topped oil (TO) or organic extract (OE): N/A

RESPONSE FILE NUMBER 2

CHIRON REFERENCES:

1/d2-C29ba; PURITY=90.20%; RESIDUAL C29ba=23.60%; G. MASS=193; BATCH#808
2/d4-C29aaR; PURITY=95.40%; RESIDUAL C29aaR= 0.00%; G. MASS=221; BATCH#938

S T E R A N E S :

COMP. NR	NAME	Ref	G. Mass	ng/mg SAT	ng/mg TO/OE
1	C21 Sterane.....	2	217	N/A	N/A
2	C22 4-Methyl Sterane	2	217	N/A	N/A
3	C22 Sterane.....	2	217	N/A	N/A
4	C27 S Diasterane.....	2	217	45.203	N/A
5	C27 aa S Sterane.....	2	217	6.282	N/A
6	C27 bb R Sterane.....	2	217	13.626	N/A
7	C27 bb S Sterane.....	2	217	13.626	N/A
8	C27 aa R Sterane.....	2	217	6.491	N/A
9	C29 aa S Sterane.....	2	217	3.781	N/A
10	C29 bb R Sterane.....	2	217	11.195	N/A
11	C29 bb S Sterane.....	2	217	8.106	N/A
12	C29 aa R Sterane.....	2	217	6.878	N/A
13	TOTAL STERANES.....	2	217	717.514	N/A

T E R P A N E S :

COMP. NR	NAME	Ref	G. Mass	ng/mg SAT	ng/mg TO/OE
19	C23 tricyclic.....	1	191	6.533	N/A
20	C24 tetracyclic.....	1	191	N/A	N/A
21	Is.....	1	191	13.684	N/A
22	Im.....	1	191	14.825	N/A
23	29 ab Hopane.....	1	191	29.649	N/A
24	30 ab Hopane.....	1	191	33.638	N/A
25	30 ba Hopane.....	1	191	6.841	N/A
26	31 ab S Homohopane.....	1	191	12.542	N/A
27	31 ab R Homohopane.....	1	191	10.262	N/A
28	32 ab S Homohopane.....	1	191	7.982	N/A
29	32 ab R Homohopane.....	1	191	5.702	N/A
30	TOTAL TERPANES.....	1	191	411.223	N/A
31	C30 tricyclic, 22 S.....	1	191	below limits	N/A
32	C30 tricyclic, 22 R.....	1	191	below limits	N/A
33	29 Desmethyl Hopane.....	1	177	N/A	N/A
34	C28 Bishomohopane.....	1	191	below limits	N/A
35	C29 18 a(H) Hopane.....	1	191	13.684	N/A
36	18 a(H) Oleanane.....	1	191	below limits	N/A
37	Gammacerane (C30).....	1	191	3.419	N/A
38	C33 ab S Homohopane.....	1	191	4.561	N/A
39	C33 ab R Homohopane.....	1	191	3.419	N/A
40	C35 Hexacyclic.....	1	191	below limits	N/A
41	C35 ab S Homohopane.....	1	191	below limits	N/A
42	C35 ab R Homohopane.....	1	191	below limits	N/A

Tab.4

1/3-6

DESCRIPTION OF ANALYSED SAMPLES AND ORGANIC CARBON CONTENT

AGE AND/OR FORMATION	LAB. REF.	SAMPLE TYPE	DEPTHS Metres	IR %	TOC %	IOC %	L I T H O L O G Y
UPPER PALEOCENE/COD Fm	B45748	CA01	2921.77		.15		SANDSTONE SANDSTONE SANDSTONE SANDSTONE
UPPER PALEOCENE/COC Fm	B45749	CA01	2922.37		.14		
UPPER PALEOCENE/COD Fm	B45750	CA01	2923.65		.21		
UPPER PALEOCENE/COD Fm	B45751	CA01	2924.83		.16		

Tab.5

1/3-6

MINERALOGICAL COMPOSITION BY X-RAY DIFFRACTION

AGE AND/OR FORMATION	LAB. REF.	SAMPLE TYPE	DEPTHS Metres	IR %	TOC %	IOC %	ALB %	ORT %	ANH %	QRZ %	CAL %	DOL %	SID %	ND %
UPPER PALEOCENE/COD Fm	B45748	CA01	2921.77		.15		4	1	0	63	0	0	0	32
UPPER PALEOCENE/COC Fm	B45749	CA01	2922.37		.14		4	1	0	63	4	0	0	28
UPPER PALEOCENE/COD Fm	B45750	CA01	2923.65		.21		4	1	0	64	1	0	0	30
UPPER PALEOCENE/COD Fm	B45751	CA01	2924.83		.16		4	1	0	51	12	0	0	32

Tab.6

1/3-6

RESULTS OF ORGANIC INVENTORY ANALYSIS

LAB. REF.	SAMPLE TYPE	DEPTHS Metres	R O C K - E V A L									E X T R A C T A N A L Y S I S									
			Q1	on	Tmax	S1	S2	S3	PI	HI	OI	TOC	IOC	Q2	EOM	100(EOM/TOC)	SAT	ARO	POL	SAT/ARO	HC
B45748	CA01	2921.77	N	RT	#	.32	.31	.63	.51	207	>170	.15		N	.091	60.9	77.2	14.4	8.4	5.35	.84
B45749	CA01	2922.37	N	RT	#	.49	.17	.80	.74	121	>170	.14		N	.105	75.2	70.9	16.2	12.9	4.37	.92
B45750	CA01	2923.65	N	RT	401	.48	1.05	.50	.31	500	>170	.21		N	.077	36.8	78.3	13.1	8.6	5.97	.71
B45751	CA01	2924.83	N	RT	#	.32	.20	1.04	.62	125	>170	.16		N	.071	44.1	72.0	14.1	14.0	5.12	.61