

SNEA (P)
DIRECTION EXPLORATION
LABORATOIRE DE GEOLOGIE DE BOUSSENS

GEO/LAB Bss. n° 2/2281 RP
/lg

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33 / 5 - 1 WELL (NORWAY)
GEOCHEMICAL AND OPTICAL STUDY
(CRETACEOUS AND TRIASSIC)

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G. NICOLAS

Boussens MAI 1982

LISTE DE DIFFUSION

DESTINATAIRES :

DIVISION PROGRAMMES PARIS A L'INTENTION DE L'EXPERT REGIONAL EXPLO. EUROPE	1
EXPLO. DIG EUROPE	2
ELF-AQUITAINE NORGE s/c EXPLO. DIG EUROPE	12
DIVISION ETUDES ET SYNTHESES PAU	1
DIVISION ETUDES ET SYNTHESES PARIS	1
DIVISION ORIENTATIONS ET ZONES NOUVELLES PARIS	1
DIVISION ORIENTATIONS ET ZONES NOUVELLES PAU	1
D.R.A BOUSSENS	1
D.R.A PAU	1
S.I.D BOUSSENS (Archivage)	2

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The aim of this study was to characterize the hydrocarbons in the lower Cretaceous of the 33/5-1 well, and to get some indication of the degree of maturation of the triassic interval.

1 - ORGANIC GEOCHEMISTRY (LOWER CRETACEOUS)

6 cutting samples from lower Cretaceous (1760 - 2650 m) have been analysed by pyrolysis and the extracts of 3 of them analysed by chromatography.

- The amount of total organic carbon (TOC) is rather low : $0.75 < \text{TOC} < 2.50$ % of rock.

- The temperatures of pyrolysis (T_m) are low (425 to 430° C) down to 2520 m, medium at 2646 m (441°C). They suggest a low maturation.

- The Rock Eval pyrolysis show that all the samples have a low potential. The related hydrogen indices of kerogen are low (< 90 mg H.C./g TOC) and oxygen indices are high (up to 425 mg CO₂/g TOC).

The S₁/(S₁ + S₂) ratio indicative of hydrocarbon accumulation (migrated or not) is high to very high. Three samples which show different steps of enriching have been selected for detailed analysis (table 2) They show mainly a relatively high saturated HC/aromatic HC ratio (2.4 to 2.9) and a large predominance of saturated HC + aromatic HC (70 to 80 %)

The genetic characteristics (Pristane /nC₁₇) / (Phytane /nC₁₈) ~ 1.4 and the degree of maturation of these hydrocarbons suggest that they are migrated from an upper jurassic source rock with a medium degree of catagenesis, not drilled in this well.

2 - OPTICAL STUDY IN THE TRIASSIC

2. 2 - REFLECTANCE - FLUORESCENCE (Triassic)

4 Cutting samples have been analysed between 2660 (Cretaceous) and 3544 (Triassic). All the samples are largely polluted by lignituous mud products which are typical coals with a low reflectance of 0.2 %

The first two samples are rich in fluorescent rocks impregnated with bitumens. The lack of reliable organic particules in white light and of sapropelic bed in fluorescence does not enable us to draw any conclusions about the catagenesis of this interval.

.../...

ABBREVIATIONS AND UNITS - TABLES 1 & 2

TOC	Total organic carbon, % of rock	
S1	Hydrocarbons extractible by heating	} mg HC/g of rock
S2	Hydrocarbons produced by pyrolysis	
HI	Hydrogen index, mg HC/g TOC	
OI	Oxygen index, mg CO ₂ /g TOC	
T _m	Temperature (°C) at the top of peak S2	
Alk % TV	Percentage of n - Alkanes in the C 5 - C 15 range	
EOM	Extractible organic matter, in ppm	
S/A	Saturated H.C / aromatic HC	
A = Pr/17	Pristane / nC 17	
B = Ph/18	Phytane / nC 18	
Alk % Sat	Percentage of n - Alkanes in the saturated fraction.	

TABLE 1 : 33 / 5 - 1 ORGANIC INVENTORY

	TOC	S1	S2	HI	OI	Tm	$\frac{S1}{S1 + S2}$	Alk % TV
1765 m	0.75	0.60	0.28	35	220	425	.68	
1915	0.88	0.67	0.43	50	170	426	.61	
2094	1.10	0.90	0.96	85	160	427	.48	51
2314	1.00	1.05	0.89	90	175	420	.54	51
2520	1.20	1.67	0.84	70	425	430	.66	38
2646	2.50	0.64	1.49	60	85	441	.30	

TABLE 1 : 33 / 5 - 1 GROSS COMPOSITION OF EXTRACTS

	EOM	Asph	Res	Sat	Aro	S/A	A = $\frac{Pr}{17}$	B = $\frac{Ph}{18}$	A/B	Alk % Sat
2090 - 94	3070	2.1	20.3	54.9	22.7	2.4	0.80	0.55	1.44	12
2312 --16	1950	2.0	28.0	52.2	17.8	2.9	0.84	0.57	1.46	15
2516 - 22	2150	3.2	25.1	52.5	19.2	2.7	0.78	0.57	1.36	16

Elf aquitaine

NORWAY

DIRECTION GENERALE DES PRODUCTIONS

DIRECTION REPERATION

Sept. 80
G. Nicolas
A 7360

PL 1

33 / 5 - 1

ORGANIC MATTER
PETROLOGY

REFLECTANCE
(measurements)

FLUORESCENCE
(global amount estimated)

□ Vitrinite

■ Fluorescent macerals

▨ Bitumens

▨ Hydrocarbon traces in reservoirs

MP Mud products

R E F L E C T A N C E

F L U O R E S C E N C E

VITRINITE
BITUMEN

GLOBAL
ESTIMATED

ORGANIC MATTER
NATURE

0

1

2%

1

2

3

4

CRETACEOUS

2692

2660/70

MP

MP

MP

MP

TRIASIC

3200/10

3460/64

3540/44

▨

▨

▨

▨

▨

▨

Réservoirs
Mud products

d°

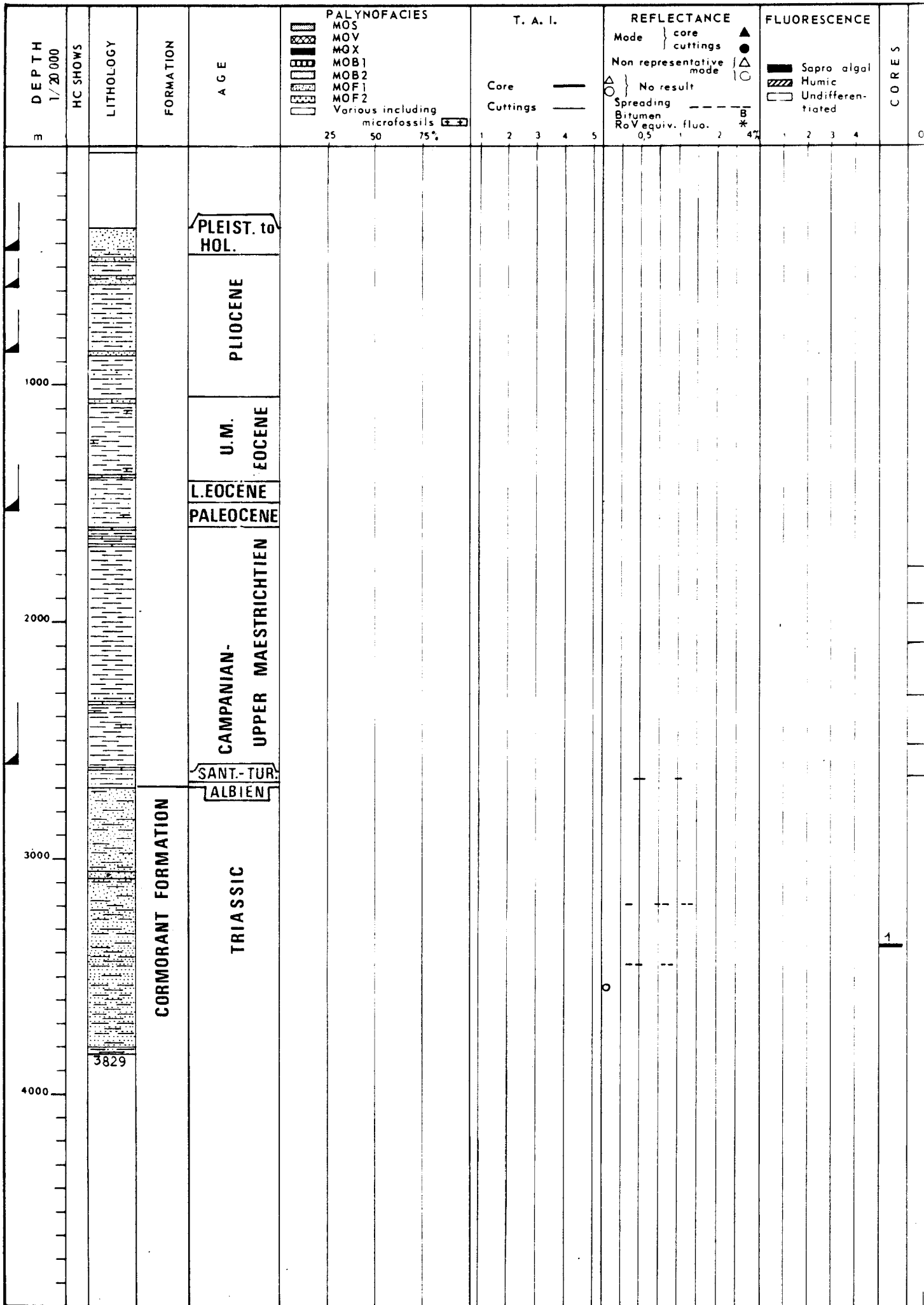
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ORGANIC MATTER STUDY

SYNTHESIS OF RESULTS

Plate: 2



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PAYS : NORWAY
Country

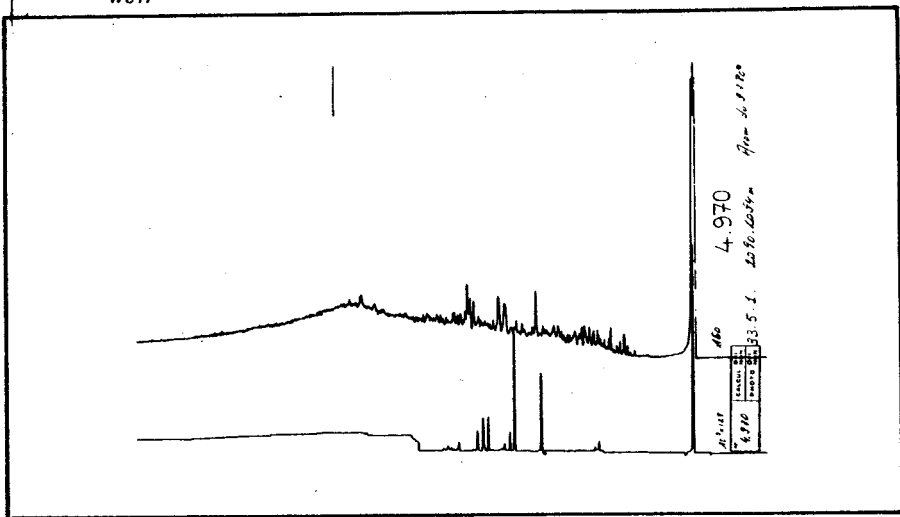
SONDAGE : 33 / 5 - 1
Well

Cote Depth 2090 - 2094 m

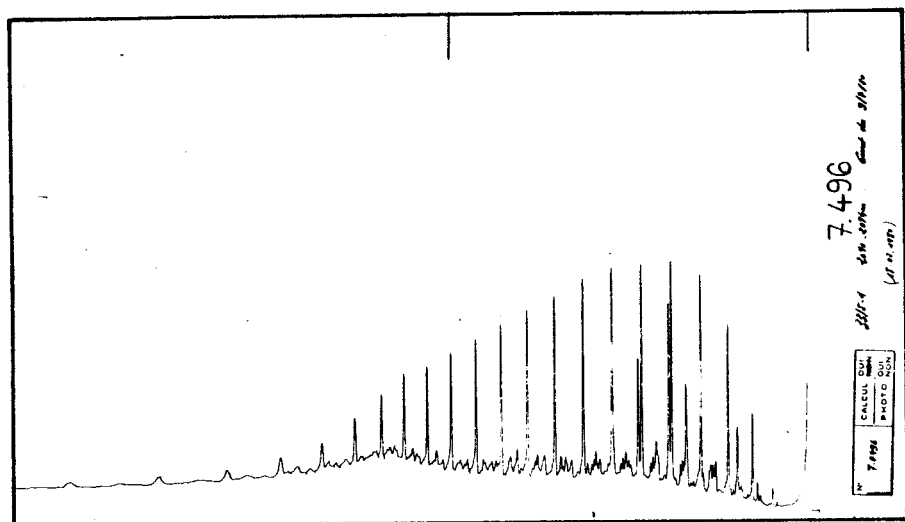
Identification Identification Cuttings

Roche Formation
Rock Formation

Age Lower CRETACEOUS
Age



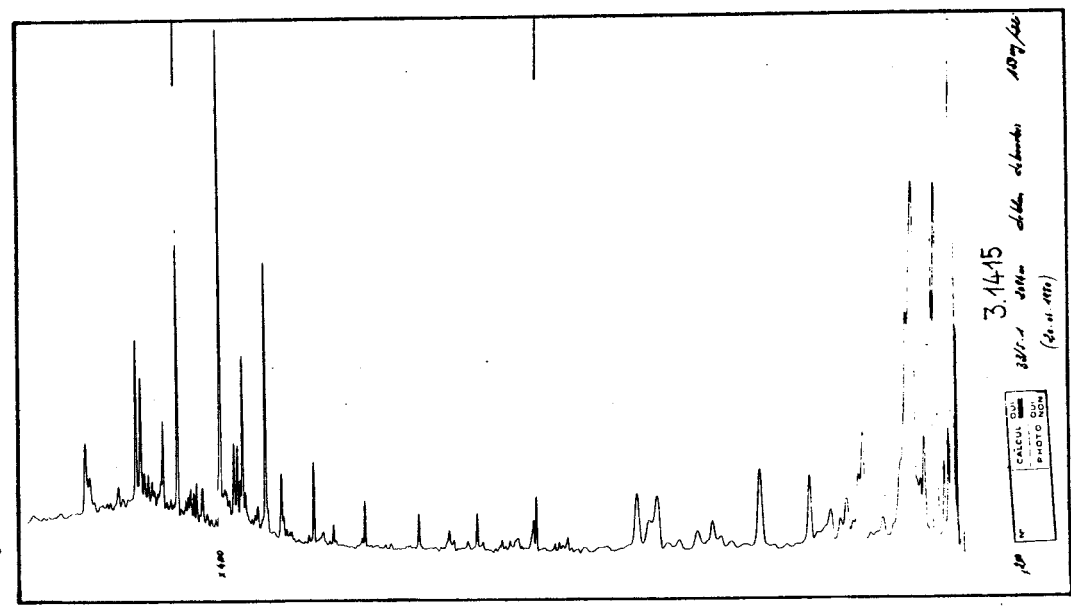
HC AROMATIQUES AROMATIC HC



HC SATURES SATURATED HC

Composition du produit total (%)
Composition of total product

Asphaltènes Asphaltenes	As	:	
Résines Resins	R	:	
HC saturés Saturated HC	S	:	$\frac{S}{A}$
HC aromatiques Aromatic HC	A	:	A
Distillat Distillate	D	:	

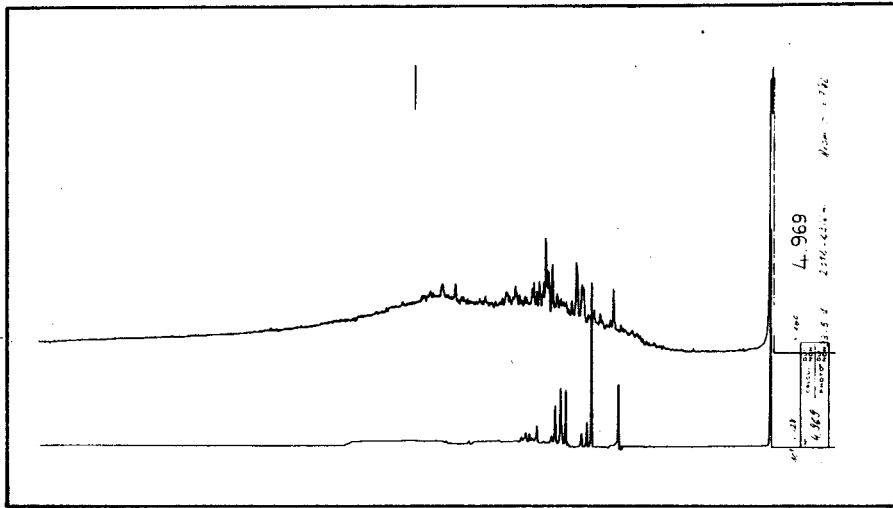


HC THERMOVAPORISES THERMOVAPORIZED HC

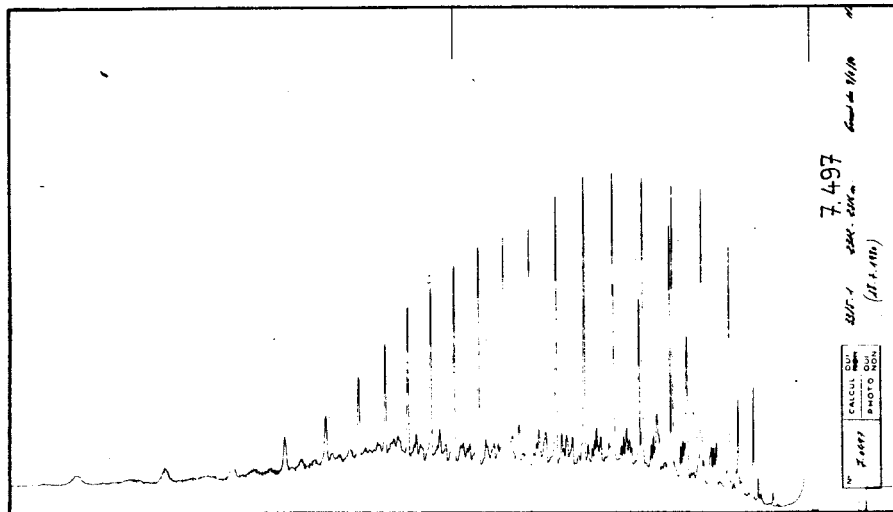
S. N. E. A. (P)

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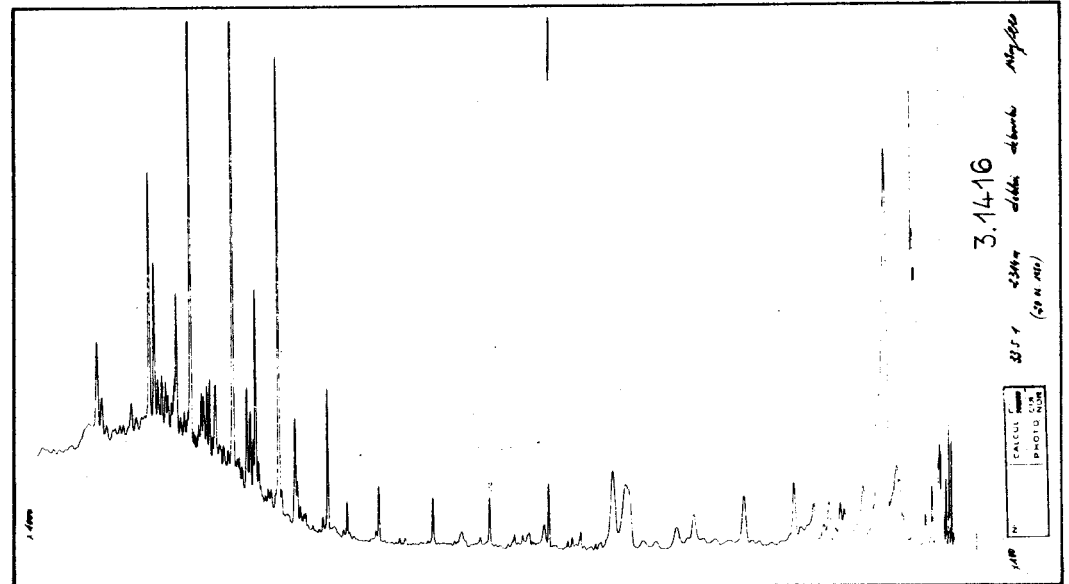
PAYS : NORWAY
 Country :
 SONDAGE : 33 / 5 - 1
 Well :



HC AROMATIQUES AROMATIC HC



HC SATURES SATURATED HC



HC THERMOVAPORISES THERMOVAPORIZED HC

Cote Depth 2312 - 2316 m
 Identification Cutting
 Identification
 Roche Rock Formation Formation
 Age Lower CRETACEOUS
 Age

Composition du produit total (%)
 Composition of total product

Asphaltènes Asphaltenes	As	:	
Résines Resins	R	:	
HC saturés Saturated HC	S	:	$\frac{S}{A}$
HC aromatiques Aromatic HC	A	:	A
Distillat Distillate	D	:	

7.497
 2312-2316 m
 (33/5-1)
 CALCUL
 PHOTO DU

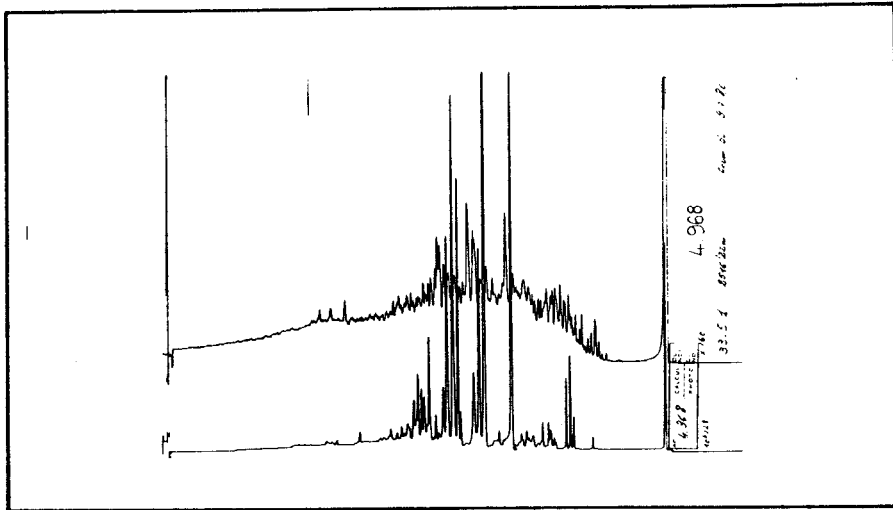
3.1416
 2312-2316 m
 (33/5-1)
 CALCUL
 PHOTO DU

S. N. E. A. (P)

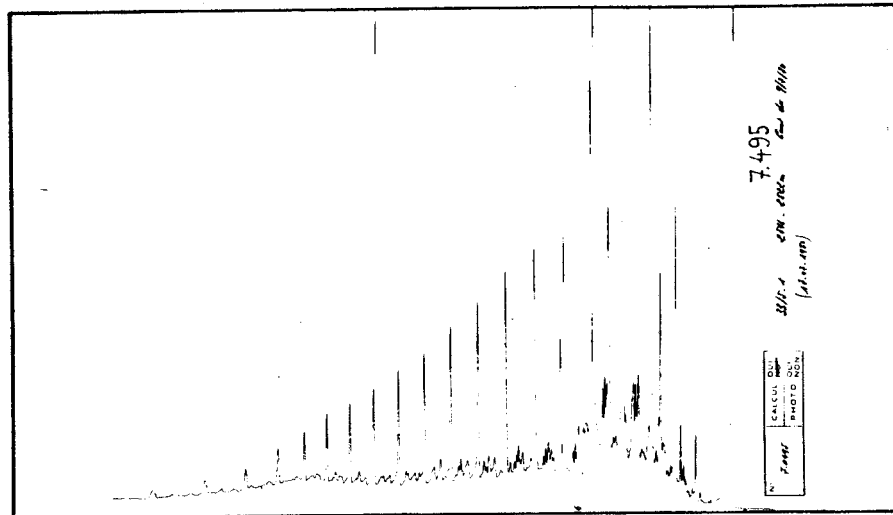
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PAYS : NORWAY
 Country :
 SONDAGE : 33 / 5 - 1
 Well :

Cote : 2516 - 2522 m
 Depth :
 Identification : Cutting
 Identification :
 Roche : Formation
 Rock :
 Age : Lower CRETACEOUS
 Age :



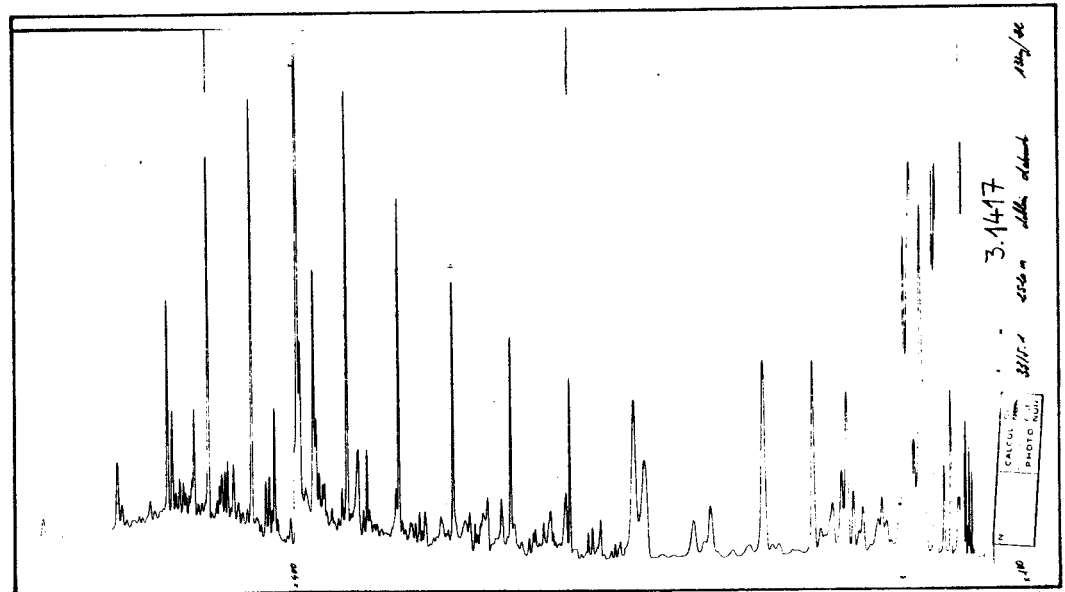
HC AROMATIQUES AROMATIC HC



HC SATURES SATURATED HC

Composition du produit total (%)
 Composition of total product

Asphaltènes Asphaltenes	As	:	
Résines Resins	R	:	
HC saturés Saturated HC	S	:	$\frac{S}{A}$
HC aromatiques Aromatic HC	A	:	A
Distillat Distillate	D	:	



HC THERMOVAPORISES THERMOVAPORIZED HC