



EP/S/EXP/Lab n° 90-215RPGO

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REGISTRERT

OLJEDIREKTORATET

WELL 25/5-3 (NORWAY)

**Geochemical screening
and optical study**

EP/S/EXP/Lab n° 90-215RPGO

**Authors : K. LE TRAN
R. BARANGER
G. NICOLAS**

adresse postale : tour Elf - Cedex 45 92078 Paris La Défense
 Pau - 64018 Pau Cedex
 Lacq - bp 22 Lacq 64170 Artix
 Boussens - Boussens 31360 Saint Martory

téléphone : - 33 - (1) 47 44 45 46
- 33 - 59 83 40 00
- 33 - 59 92 22 22
- 33 - 61 97 80 00

télex : elfa 615 400 f
petra 560 804 f
petra 560 053 f
snea 530 385 f

INTRODUCTION

This report deals with the geochemical study aiming at assessing the source rock potential, the maturity of the sediments over the well section as well as the content and composition of the fluids contained in the reservoirs.

To achieve the above goals, optical studies were carried out on kerogen concentrates of selected samples of cores, sidewall cores and cuttings over the interval ranging from 2040 to 2845 m (TD = 2900 m), whereas organic geochemical screening analyses (TOC, Rock Eval pyrolysis, EOM, Iatroscan) were performed on shales and coals for source evaluation on one hand, on sands and sandstones for reservoir fluid assessment on the other hand.

LEGENDS OF TABLES AND FIGURES OF ORGANIC INVENTORY ANALYSES : ABBREVIATIONS, UNITS AND CUT OFFS

SAMPLE TYPE : ND=unwashed cuttings; DE=cuttings washed on site. (The ND are washed and the DE are washed anew in the laboratory)
CA=core; CL=sidewall core; TE=outcrop; BO=mud; XX=other or undetermined
IR : Insoluble residue after HCl attack (% weight of rock)

LECO TOC : Total organic carbon (% weight of rock)
ANALYSIS IOC : Insoluble organic carbon in chloroform (% weight of rock)
OC : Organic carbon (total or insoluble)

X-RAY DIFF. : ALBite ; ORThoclase ; ANHydrite (or chlorite/kaolinite) ; QuaRtZ ; CALcite ; DOLomite ; SIDerite ; uNDosed (% weight of rock)

ROCK EVAL Carried out on : [generally not performed if OC < .3%]
ANALYSIS RT : Total rock
RI_RT : Insoluble residue after HCl attack
RE : Rock extracted with chloroform
RI_RE : Rock extracted with chloroform, and after HCl attack
Measured parameters : [# : result not given because meaningless; <S : lower than the detection threshold]
Tmax : Temperature of S2 peak (°C) [meaningless if S2 small]
S1 : Free hydrocarbons in the rock (mgHC/g of rock) [meaningless if the analysis is performed on the extracted rock]
S2 : Hydrocarbons yielded by pyrolysis (mgHC/g of rock)
S3 : CO2 yielded by pyrolysis (mg CO2/g of rock)
Calculated parameters :
PI : Production Index= S1/(S1+S2) [# : meaningless if S1 and S2 < .2]
HI : Hydrogen Index = (S2/OC)x100 (mg HC/g OC)
OI : Oxygen Index = (S3/OC)x100 (mg CO2/g OC) .. [to be used with caution for analyses carried out on RT or RE if OC < 2%;
IO>170 : mineral contribution to S3 peak]

IATROSCAN Fast and non preparative analysis of the chloroformic extract (quantity and composition)
ANALYSIS EOM: Extractable organic matter with chloroform (% weight of rock) [<S if lower than .01%]
Normalized composition of the extract (% EOM) : [not performed if EOM < .03%]
SAT: Saturated hydrocarbons
ARO: Aromatic hydrocarbons
POL: Polar compounds (Resins+Asphaltenes)
HC: SAT+ARO (mg HC/g of rock)

Q1: Contaminations or cavings, affecting the Rock Eval and TOC analyses | I=high; M=medium; F=low;
Q2: Contaminations or cavings, affecting the organic extract | N=null or not detected; U=unknown

DESCRIPTION OF ANALYSED SAMPLES AND ORGANIC CARBON CONTENT

LAB. REF.	SAMPLE TYPE	DEPTHS Metres	IR %	TOC %	IOC %	LITHOLOGY
B28871	CL	2139.00		.19		SAND, CLEAR, WHITE, LIGHT GREY, LOOSE FRIABLE, ARGILLACEOUS
B28870	CL	2140.00		.43		SAND, CLEAR, WHITE, LIGHT GREY, LOOSE FRIABLE, ARGILLACEOUS
B28832	CL	2367.00		2.08		SHALE, DARK OLIVE BROWN, MODERATELY HARD, WAXY, SL. MICROMICACEOUS
B28872	CL	2380.00		4.12		SHALE, DARK OLIVE BROWN, MODERATELY HARD, WAXY, SL. MICROMICACEOUS
B28882	CA01	2388.00				SANDSTONE, FINE GRAINED, VERY MICROMICACEOUS
B28883	CA01	2391.00				SANDSTONE, FINE GRAINED, VERY MICROMICACEOUS
B28884	CA01	2393.00				SANDSTONE, FINE GRAINED, VERY MICROMICACEOUS, PYRITE NODULES
B28885	CA01	2394.50				SANDSTONE, FINE GRAINED, VERY MICROMICACEOUS,
B28886	CA01	2397.00				SANDSTONE, FINE GRAINED, SLIGHTLY MICROMICACEOUS, LIGHT BROWN
B28887	CA01	2399.00				SANDSTONE, FINE GRAINED, SLIGHTLY MICROMICACEOUS
B28888	CA01	2402.00				SANDSTONE, FINE GRAINED, SLIGHTLY MICROMICACEOUS
B28889	CA01	2403.80				SANDSTONE, SHALY, GREENISH GREY, VERY MICROMICACEOUS
B28873	CL	2421.50				SANDSTONE, LIGHT GREY, FINE, POORLY CONSOLIDATED, SL. MICROMICACEOUS
B28874	CL	2425.00				SANDSTONE, LIGHT GREY, FINE, POORLY CONSOLIDATED, SL. MICROMICACEOUS
B28875	CL	2428.70				SANDSTONE, LIGHT GREY, FINE, POORLY CONSOLIDATED, SL. MICROMICACEOUS
B29286	ND	2430.00		71.81		COAL
B28876	CL	2439.50				SANDSTONE, LIGHT GREY, FINE, POORLY CONSOLIDATED, SL. MICROMICACEOUS
B28877	CL	2460.00		2.31		SHALE, OLIVE GREY BROWN, SLIGHTLY SILTY, SLIGHTLY MICROCEOUS
B28878	CL	2476.00		2.13		SHALE, OLIVE GREY BROWN, SLIGHTLY SILTY, SLIGHTLY MICROCEOUS
B28879	CL	2512.50		.67		SHALE, GREYISH BROWN, MOD. HARD, SLIGHTLY CALCAREOUS, LOC. MICROCEOUS
B28844	CL	2535.00		1.24		SHALE, BROWNISH GREY, MOD. HARD, WAXY, SL. MICROMICACEOUS, LOC. SILTY
B28880	CL	2590.00		.68		SHALE, BROWNISH GREY, MOD. HARD, SLIGHTLY SILTY, SLIGHTLY CALCAREOUS
B28881	CL	2601.00		.54		SHALE, BROWNISH GREY, MOD. HARD, SLIGHTLY SILTY, SLIGHTLY CALCAREOUS
B28890	CA02	2615.00				SANDSTONE, COARSE GRAINED
B28892	DE	2615.00		.44		SANDSTONE, COARSE GRAIN
B28891	CA02	2628.20		1.12		SHALE, BROWNISH GREY, MICROMICACEOUS
B28893	DE	2660.00		42.06		COAL
B28850	CL	2700.00		2.16		SHALE, GREENISH GREY, FIRM, SLIGHTLY SILTY, SLIGHTLY CALCAREOUS
B28894	DE	2705.00		7.82		SHALE, COALY
B28854	CL	2782.50		.21		SHALE, MOD. BROWN, LOC. GREENISH GREY, MOTTLED, MOD. HARD, SL.CALCAREOUS
B28895	DE	2845.00 2855.00		.44		SHALE, RED

TABLE: B2.2

25/5-3

MINERALOGICAL COMPOSITION BY X-RAY DIFFRACTION

LAB. REF.	SAMPLE TYPE	DEPTHS Metres	IR %	TOC %	IOC %	ALB %	ORT %	ANH %	QRZ %	CAL %	DOL %	SID %	ND %
B28871	CL	2139.00		.19		10	4	1	50	0	0	0	35
B28870	CL	2140.00		.43		4	3	1	46	0	0	0	46
B28832	CL	2367.00		2.08		1	0	0	18	1	0	0	80
B28872	CL	2380.00		4.12		5	2	1	27	0	0	1	64
B28882	CA01	2388.00				8	7	1	55	0	1	0	28
B28883	CA01	2391.00				6	11	2	55	0	1	0	25
B28884	CA01	2393.00				6	8	1	44	0	10	0	31
B28885	CA01	2394.50				6	10	2	56	0	1	0	25
B28886	CA01	2397.00				3	6	1	68	5	0	6	11
B28887	CA01	2399.00				5	6	2	62	1	1	0	23
B28888	CA01	2402.00				4	9	2	67	0	1	0	17
B28889	CA01	2403.80				4	9	2	36	0	2	3	44
B28873	CL	2421.50				5	7	1	57	0	2	0	28
B28874	CL	2425.00				4	5	1	67	0	1	0	22
B28875	CL	2428.70				3	7	3	42	1	1	1	42
B29286	ND	2430.00		71.81									
B28876	CL	2439.50				2	5	2	30	0	0	1	60
B28877	CL	2460.00		2.31		2	1	0	18	1	1	1	76
B28878	CL	2476.00		2.13		2	1	0	21	7	0	2	67
B28879	CL	2512.50		.67		1	0	0	6	0	0	40	53
B28844	CL	2535.00		1.24		3	1	2	29	0	0	1	64
B28880	CL	2590.00		.68		0	1	2	30	0	0	0	67
B28881	CL	2601.00		.54		3	2	2	26	2	0	0	65
B28890	CA02	2615.00				2	3	0	87	0	0	1	7
B28892	DE	2615.00		.44		2	4	1	52	4	0	4	33
B28891	CA02	2628.20		1.12		3	2	1	23	0	0	0	71
B28893	DE	2660.00		42.06		0	0	0	11	0	0	0	89
B28850	CL	2700.00		2.16		1	1	0	10	1	0	29	58
B28894	DE	2705.00		7.82		0	1	0	18	1	0	6	74
B28854	CL	2782.50		.21		7	0	1	12	3	0	0	77
B28895	DE	2845.00 2855.00		.44		6	0	1	13	9	2	0	69

RESULTS OF ORGANIC INVENTORY ANALYSIS

LAB. REF.	SAMPLE TYPE	DEPTHS Metres		ROCK - EVAL									LECO		I A T R O S C A N									
				Q1	on	Tmax	S1	S2	S3	PI	HI	OI	TOC	IOC	Q2	EOM	100(EOM/TOC)	SAT	ARO	POL	SAT/ARO	HC		
B28871	CL	2139.00		N	RT										N	<S								
B28870	CL	2140.00		N	RT	#	.10	.88	.44	.10	205	102	.19		N	.013	3.0							
B28832	CL	2367.00		N	RT	422	.18	4.48	.60	.04	215	29	2.08		N	.061	2.9	18.5	35.9	45.6	.51	.33		
B28872	CL	2380.00		N	RT	423	.57	14.04	.32	.04	341	8	4.12		N	.187	4.5	25.1	25.3	49.6	.99	.94		
B28882	CA01	2388.00													N	<S								
B28883	CA01	2391.00													N	<S								
B28884	CA01	2393.00													N	<S								
B28885	CA01	2394.50													N	.011								
B28886	CA01	2397.00													N	.010								
B28887	CA01	2399.00													N	<S								
B28888	CA01	2402.00													N	<S								
B28889	CA01	2403.80													N	.026								
B28873	CL	2421.50													N	.052		66.4	20.4	13.2	3.25	.45		
B28874	CL	2425.00													N	.042		67.6	20.5	12.0	3.30	.37		
B28875	CL	2428.70													N	.145		68.3	18.6	13.1	3.68	1.26		
B29286	ND	2430.00		N	RT	428	19.31	184.11	1.76	.09	256	2	71.81		N	1.858	2.6	5.5	41.7	52.8	.13	8.76		
B28876	CL	2439.50													N	.113		3.4	26.8	69.8	.13	.34		
B28877	CL	2460.00		N	RT	420	.23	5.29	.45	.04	229	19	2.31		N	.100	4.3	14.1	38.1	47.8	.37	.52		
B28878	CL	2476.00		N	RT	428	.09	3.78	1.02	.02	177	48	2.13		N	.097	4.5	13.7	28.7	57.6	.48	.41		
B28879	CL	2512.50		N	RT	436	<S	.42	5.42		63	>170	.67		N	.012	1.8							
B28844	CL	2535.00		N	RT	435	.05	1.58	1.70	.03	127	137	1.24		N	.033	2.7	22.8	27.1	50.0	.84	.16		
B28880	CL	2590.00		N	RT	429	.02	.38	.46	.05	56	68	.68		N	<S								
B28881	CL	2601.00		N	RT	429	.02	.23	.44	.08	43	81	.54		N	<S								
B28890	CA02	2615.00													N	<S								
B28892	DE	2615.00		N	RT	431	.04	.28	.60	.13	64	136	.44		N	.012	2.6							
B28891	CA02	2628.20		N	RT	431	.06	.61	.18	.09	54	16	1.12		N	.014	1.2							
B28893	DE	2660.00		N	RT	426	7.88	135.10	.72	.06	321	2	42.06		N	1.280	3.0	6.5	34.2	59.3	.19	5.21		
B28850	CL	2700.00		N	RT	#	<S	.04	4.41		2	>170	2.16		N	<S								
B28894	DE	2705.00		N	RT	432	.64	16.31	1.00	.04	209	13	7.82		N	.260	3.3	7.8	38.2	53.9	.20	1.20		
B28854	CL	2782.50		N	RT			#					.21		N	<S								
B28895	DE	2845.00	2855.00	N	RT	426	.04	.18	1.19		41	>170	.44		N	.014	3.2							

A N N E X E S

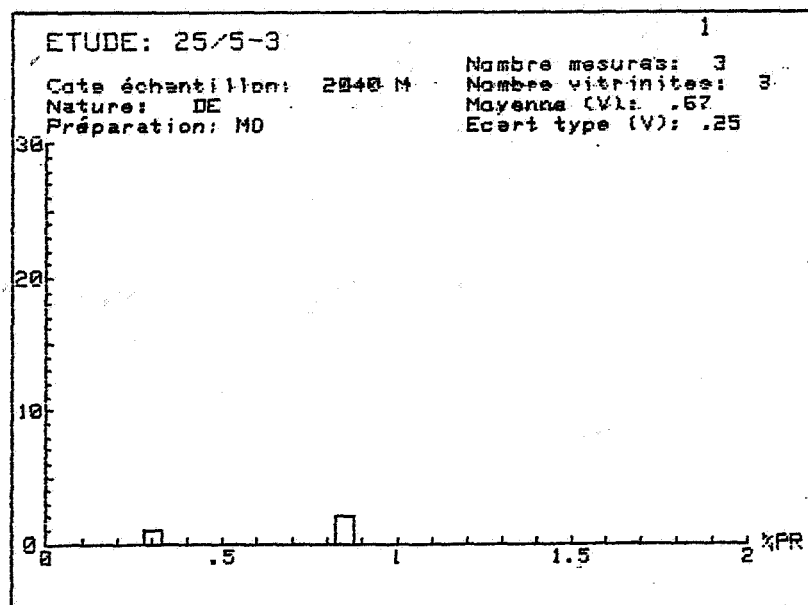
WELL :	Depth :	2040.00 M
25/5-3		2090.00 M
	Sample type :	DE
	Preparation type :	MO
	Specification :	

Measurements:

.31 V | .84 V | .85 V

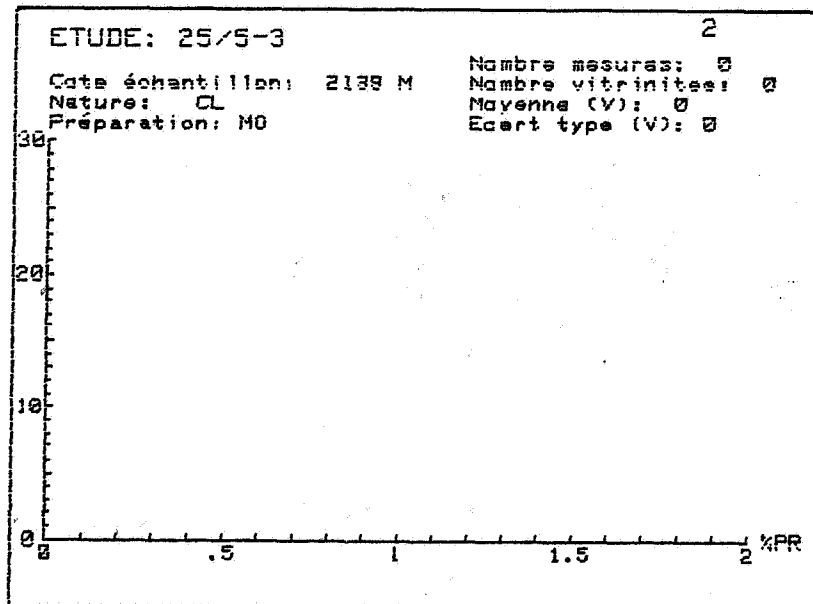
Comments:

A.green-yellow sporinite F.pale green-yellow groundmass F.vegetal tissues
 S.cutinite and alginite(Tasmanacae type) R.bitumen
 Very rare vitrinite



WELL : 25/S-3	Depth : 2139.00 M : 2139.00 M Sample type : CL Preparation type : MO Specification :
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Measurements:

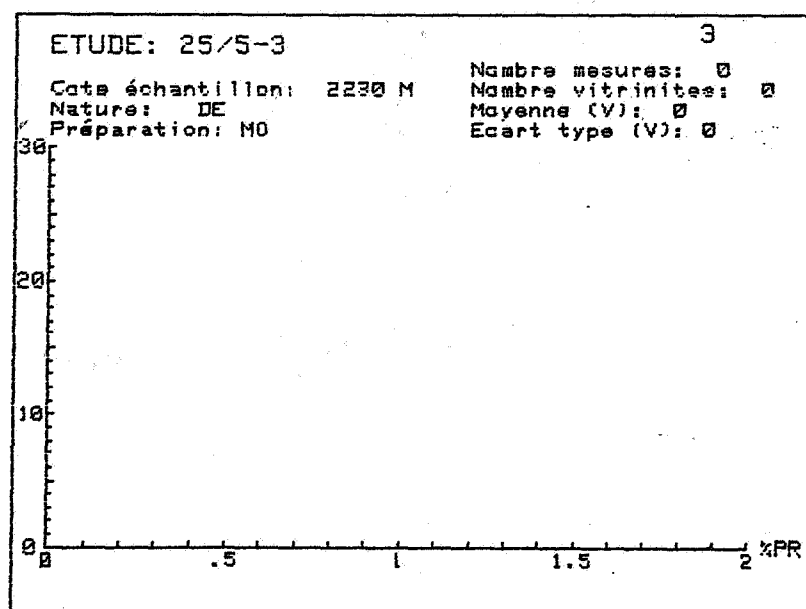


WELL :	Depth :	2230.00 M
25/5-3		2250.00 M
	Sample type :	DE
	Preparation type :	MO
	Specification :	

Measurements:

Comments:

F.alginite fragments within pale green-yellow groundmass
R.suberinite and red chlorophyllinite
Very rare vitrinite and inertinite



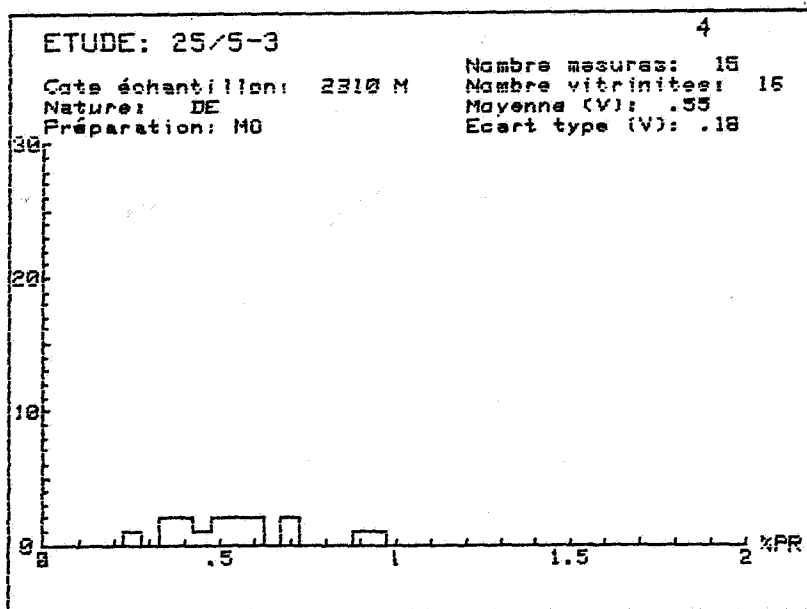
WELL :	Depth :	2310.00 M
25/5-3		2350.00 M
	Sample type :	DE
	Preparation type :	M0
	Specification :	

Measurements:

.26 V		.48 V		.61 V
.35 V		.51 V		.68 V
.36 V		.53 V		.70 V
.40 V		.57 V		.89 V
.42 V		.61 V		.95 V
.46 V				

Comments:

A.green-yellow groundmass with filamentous alginite
 F.yellow cutinite
 Few vitrinite



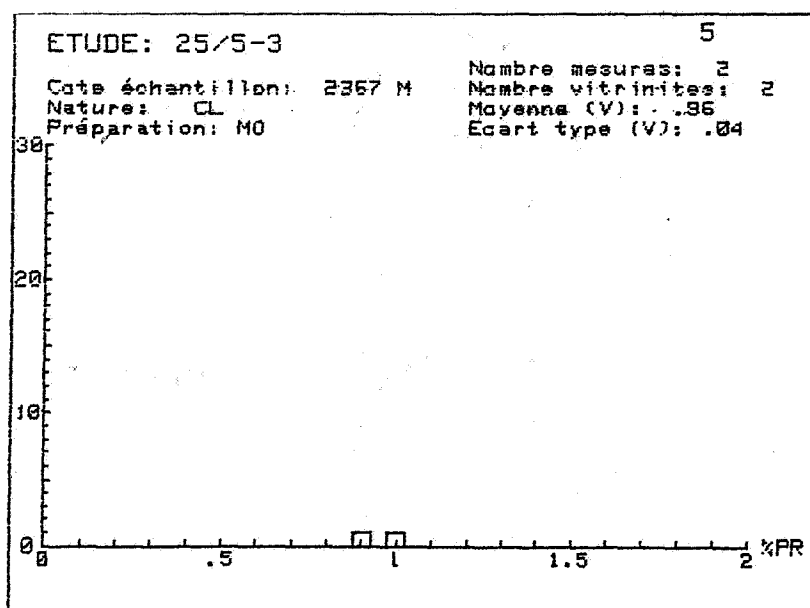
WELL :	Depth :	2367.00 M
25/5-3		2367.00 M
	Sample type :	CL
	Preparation type :	MO
	Specification :	

Measurements:

.92 V | 1.00 V |

Comments:

A.very pale groundmass with green-yellow to yellow-orange micro-organisms
(possibly of algal origin)
Very rare vitrinite



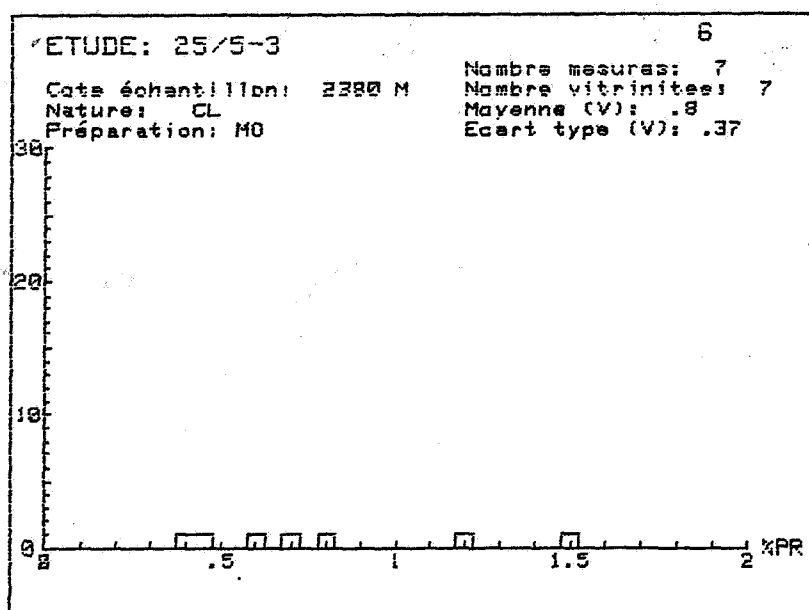
WELL :	Depth :	2380.00 M
25/5-3		2380.00 M
	Sample type :	CL
	Preparation type :	MO
	Specification :	

Measurements:

.42 V		.68 V		1.20 V
.43 V		.80 V		1.48 V
.60 V				

Comments:

F.groundmass(weakly fluorescing) with tiny micro-organisms
 S.yellow bitumen R.green/yellow Tasmanacae
 R.vitrinite



WELL :	Depth :	2385.00 M
25/5-3		2403.80 M
	Sample type :	CA
	Preparation type :	MO
	Specification :	*1

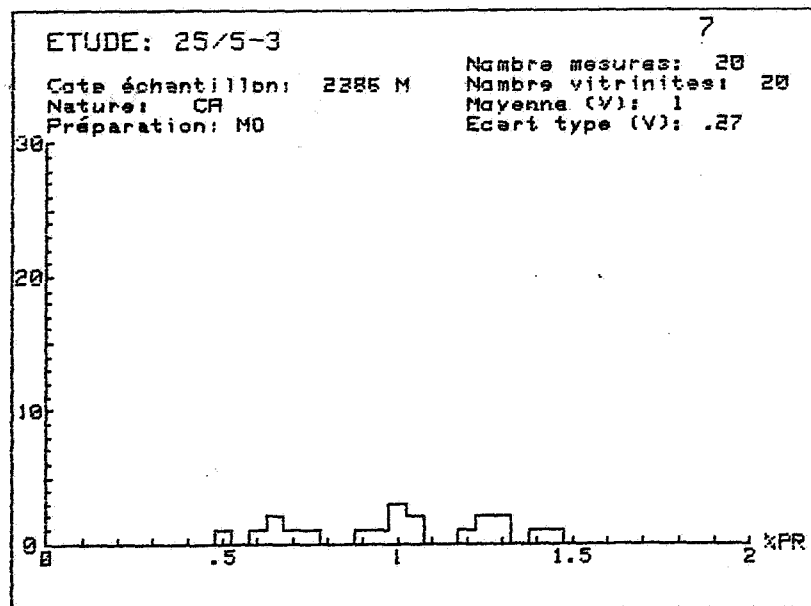
Measurements:

.49 V		.96 V		1.24 V
.58 V		1.00 V		1.24 V
.64 V		1.01 V		1.29 V
.66 V		1.02 V		1.30 V
.70 V		1.04 V		1.38 V
.76 V		1.07 V		1.43 V
.92 V		1.20 V		

Comments:

S. yellow bitumen and algae R.coals with yellow spores and cuticles.

Few vitrinite ,common semi-fusinite



Depth : 2430.00 M
 : 2430.00 M
 Sample type : DE
 Preparation type : MO
 Specification :

WELL :
 25/5-3

Measurements:

15 V .48 V
 15 V .48 V
 15 V .48 V
 15 V .48 V
 15 V .48 V
 16 V .48 V
 16 V .48 V
 16 V .49 V
 16 V .49 V
 16 V .49 V
 16 V .49 V
 16 V .49 V
 16 V .51 V
 17 V .51 V
 17 V .52 V
 17 V .52 V
 17 V .57 V
 18 V

.40 V
 .40 V
 .40 V
 .40 V
 .41 V
 .42 V
 .42 V
 .42 V
 .42 V
 .43 V
 .43 V
 .43 V
 .44 V
 .44 V
 .44 V
 .44 V
 .45 V

Nb. readings	Mean	Std. dev.
50	.46	.04

Selected measurements

Reliable VITRINITE de .4 à .5

Comments:

F.coals with sporinite and cutinite

Tri-maceral coal; abundant vitrinite

en-yellow to yellow spores

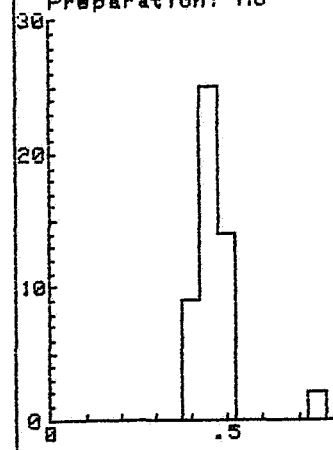
detro-vitrinite

8

Nombre mesures: 50
 Nombre vitrinites: 50
 Moyenne (V): .46
 Ecart type (V): .04

ETUDE: 25/5-3

Cote échantillon: 2
 Nature: DE
 Préparation: MO



1.5 2 %PR

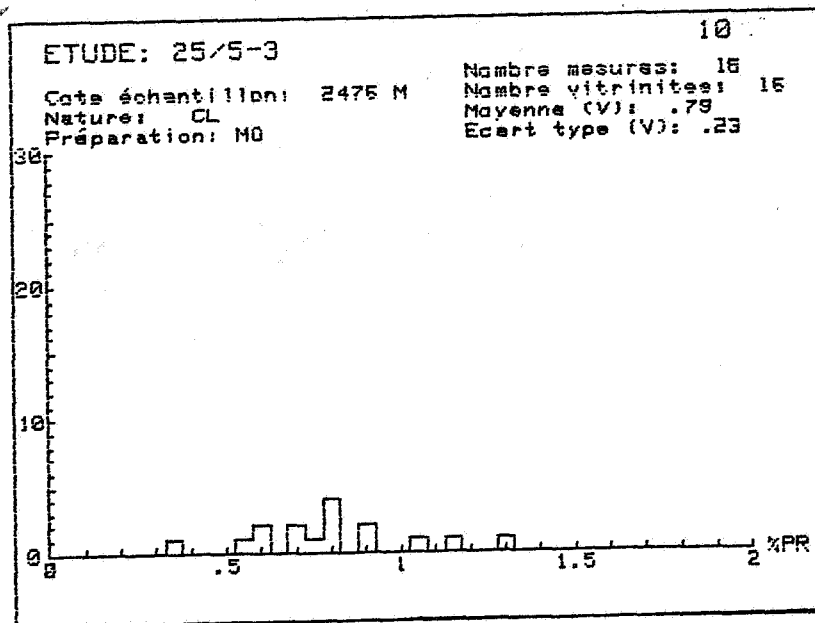
WELL :	Depth :	2476.00 M
25/5-3	:	2476.00 M
	Sample type :	CL
	Preparation type :	MO
	Specification :	

Measurements:

.56 V	.76 V	.90 V
.53 V	.80 V	.90 V
.58 V	.80 V	1.03 V
.59 V	.81 V	1.17 V
.68 V	.82 V	1.29 V
.68 V		

Comments:

R.coals with yellow-orange sporinite S.fluorescent bitumen
 R.algae(tasmanacae type)
 Few vitrinite,some inertinite



WELL : 25/5-3	Depth : 2628.30 M 2628.30 M
	Sample type : CA
	Preparation type : MO
	Specification :

Measurements:

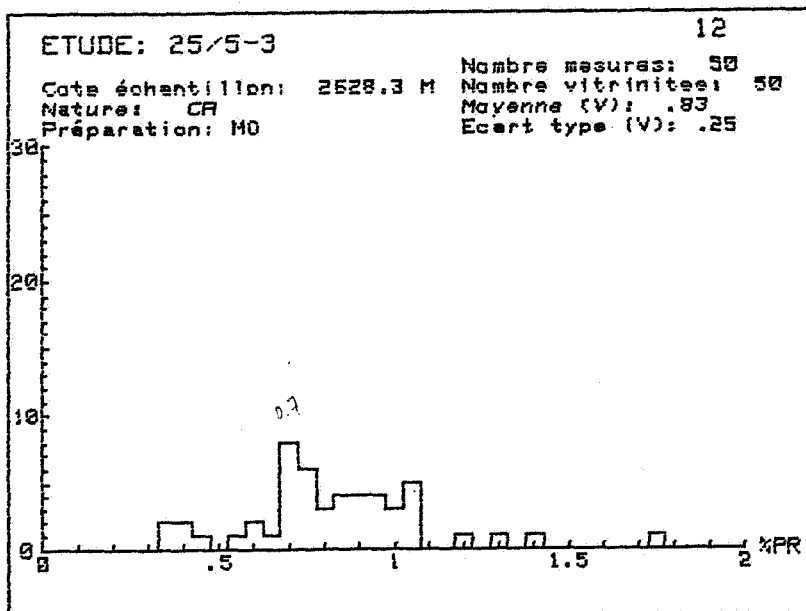
.33 V	.74 V	.93 V
.36 V	.75 V	.95 V
.40 V	.75 V	.96 V
.42 V	.75 V	.96 V
.47 V	.75 V	.98 V
.57 V	.77 V	.98 V
.58 V	.78 V	.98 V
.62 V	.81 V	1.03 V
.63 V	.82 V	1.03 V
.68 V	.85 V	1.05 V
.69 V	.87 V	1.05 V
.69 V	.87 V	1.07 V
.71 V	.87 V	1.18 V
.71 V	.89 V	1.28 V
.71 V	.91 V	1.42 V
.72 V	.91 V	1.74 V
.72 V	.91 V	

Selected measurements	Nb. readings	Mean	Std. dev.
Reliable VITRINITE de .35 à .45 %	5	.40	.05

Comments:

F.very pale groundmass with yellow micro-organisms

F.inertinite and highly reflectant vitrinite



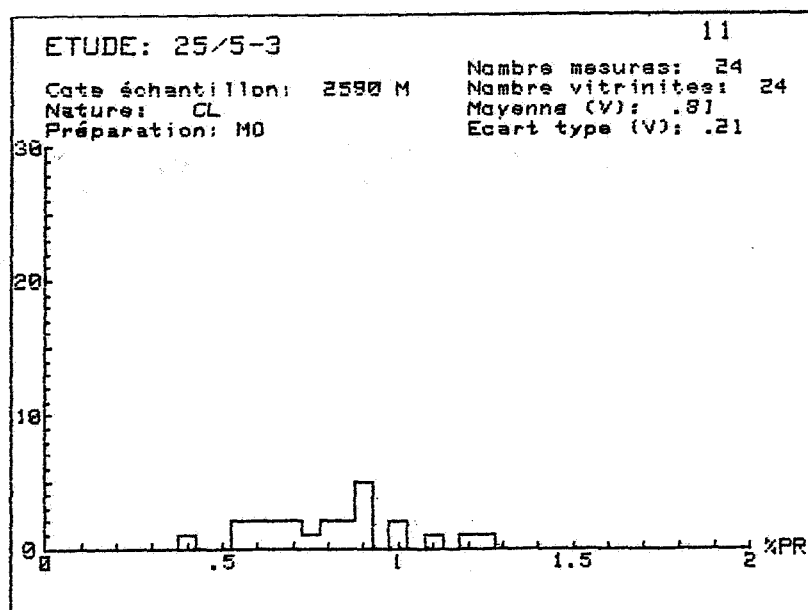
WELL : 25/5-3	Depth : 2590.00 M 2590.00 M
	Sample type : CL
	Preparation type : MO
	Specification :

Measurements:

.38 V		.71 V		.90 V
.53 V		.74 V		.91 V
.56 V		.79 V		.92 V
.59 V		.81 V		.99 V
.62 V		.83 V		1.02 V
.63 V		.84 V		1.09 V
.67 V		.88 V		1.22 V
.71 V		.89 V		1.26 V

Comments:

Common pale yellow groundmass with yellow micro-organism fragments
 S.Tasmanacae R.Botryococcus
 Few vitrinite, some inertinite



WELL : 25/5-3	Depth : 2628.30 M 2628.30 M Sample type : CA Preparation type : MO Specification :
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Measurements:

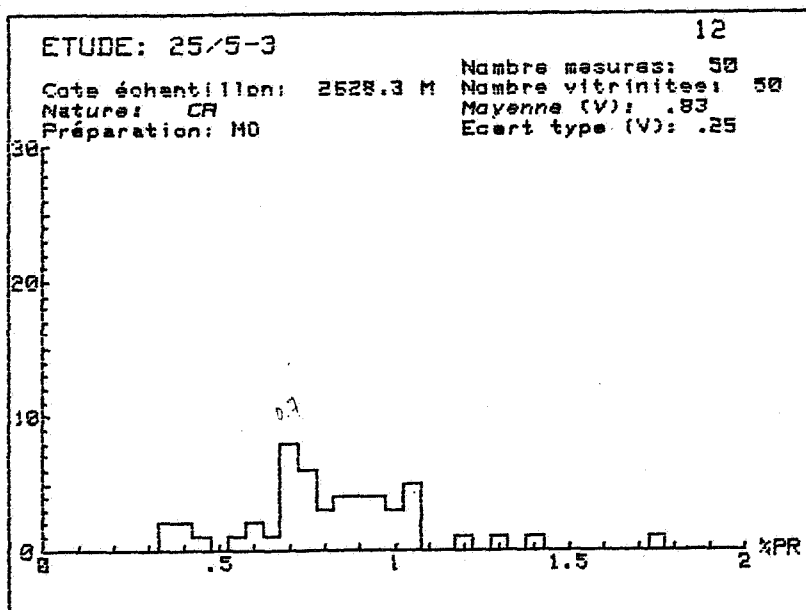
.33 V	.74 V	.93 V
.36 V	.75 V	.95 V
.40 V	.75 V	.96 V
.42 V	.75 V	.96 V
.47 V	.75 V	.98 V
.57 V	.77 V	.98 V
.58 V	.78 V	.98 V
.62 V	.81 V	1.03 V
.63 V	.82 V	1.03 V
.68 V	.85 V	1.05 V
.69 V	.87 V	1.05 V
.69 V	.87 V	1.07 V
.71 V	.87 V	1.18 V
.71 V	.89 V	1.28 V
.71 V	.91 V	1.42 V
.72 V	.91 V	1.74 V
.72 V	.91 V	

Selected measurements	Nb. readings	Mean	Std. dev.
Reliable VITRINITE de .35 à .45 %	5	.40	.05

Comments:

F.very pale groundmass with yellow micro-organisms

F.inertinite and highly reflectant vitrinite



WELL : 25/5-3	Depth : 2660.00 M : 2660.00 M Sample type : DE Preparation type : MO Specification :
------------------	--

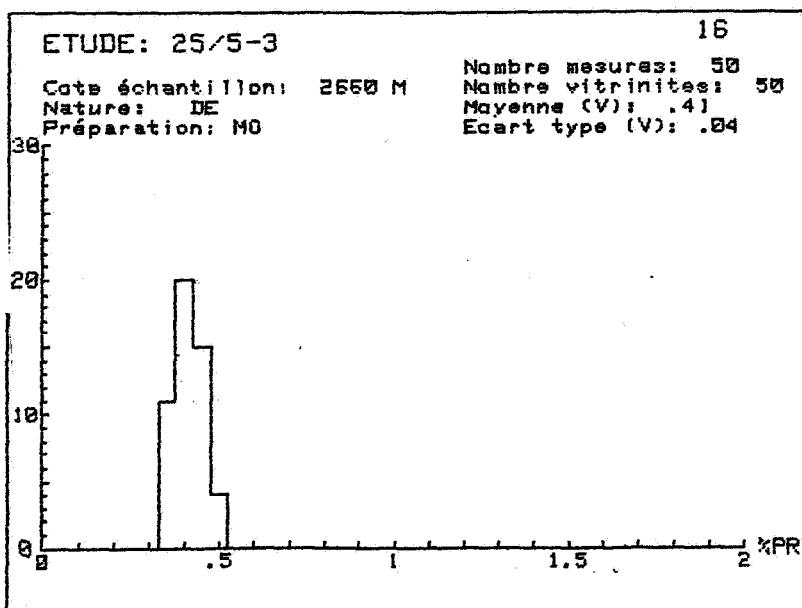
Measurements:

.33 V	.39 V	.43 V
.34 V	.39 V	.43 V
.34 V	.39 V	.44 V
.34 V	.40 V	.44 V
.36 V	.40 V	.44 V
.36 V	.40 V	.45 V
.36 V	.41 V	.45 V
.36 V	.41 V	.45 V
.37 V	.41 V	.45 V
.37 V	.41 V	.45 V
.37 V	.41 V	.46 V
.38 V	.42 V	.46 V
.38 V	.42 V	.48 V
.38 V	.42 V	.48 V
.38 V	.43 V	.49 V
.39 V	.43 V	.49 V
.39 V	.43 V	

Selected measurements	Nb. readings	Mean	Std. dev.
Reliable VITRINITE de .35 à .5 %	50	.41	.04

Comments:

F.coals with abundant yellow spores and cuticles (vitrinite fluoresces weakly)
 S.resinite
 Tri-maceral coals;abundant vitrinite;some bitumen



WELL :	Depth :	2705.00 M
25/5-3		2705.00 M
	Sample type :	DE
	Preparation type :	M0
	Specification :	

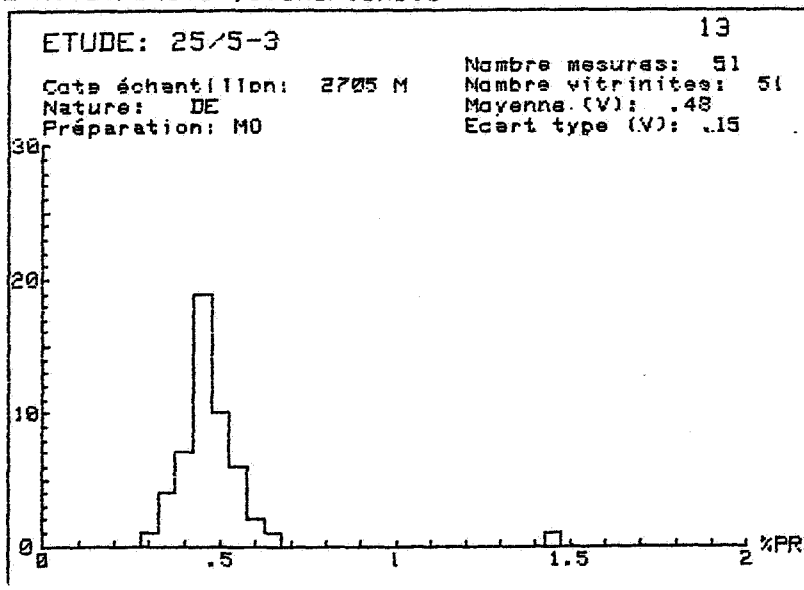
Measurements :

.30 V	.44 V	.49 V
.33 V	.45 V	.50 V
.35 V	.45 V	.50 V
.36 V	.45 V	.51 V
.36 V	.45 V	.51 V
.38 V	.45 V	.52 V
.39 V	.45 V	.52 V
.40 V	.45 V	.53 V
.41 V	.46 V	.53 V
.42 V	.46 V	.54 V
.42 V	.47 V	.54 V
.42 V	.47 V	.54 V
.43 V	.47 V	.55 V
.43 V	.47 V	.58 V
.43 V	.48 V	.61 V
.44 V	.48 V	.64 V
.44 V	.49 V	1.46 V

Selected measurements	Nb. readings	Mean	Std. dev.
Reliable VITRINITE de .3 à .65 %	50	.46	.07

Comments :

A.coals with spores and cuticles
 S.humic groundmass
 TRI-MACERAL COAL A.vitrinite ;S.inertinite



WELL : 25/5-3	Depth : 2790.00 M 2805.00 M Sample type : DE Preparation type : MO Specification :
------------------	---

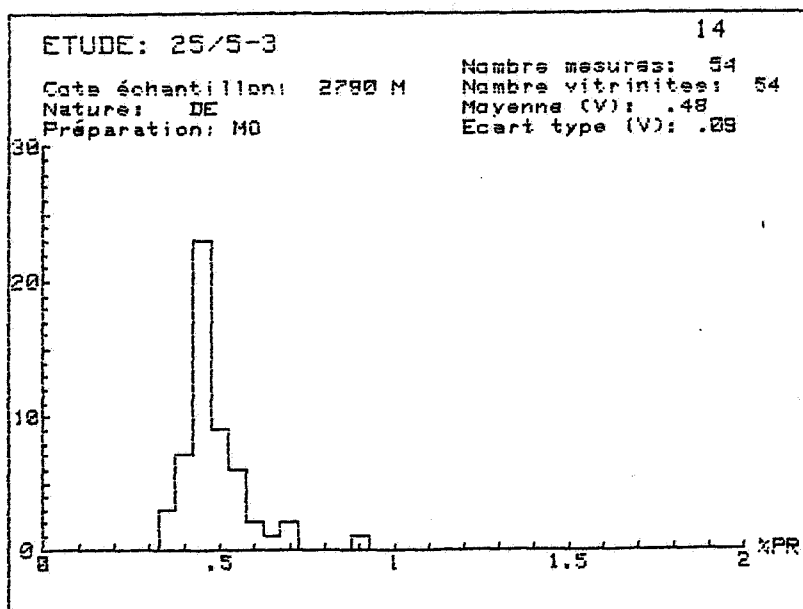
Measurements:

.34 V	.44 V	.48 V
.37 V	.44 V	.50 V
.37 V	.45 V	.50 V
.38 V	.45 V	.50 V
.38 V	.45 V	.52 V
.39 V	.45 V	.52 V
.39 V	.46 V	.53 V
.41 V	.46 V	.53 V
.41 V	.46 V	.53 V
.42 V	.46 V	.53 V
.43 V	.46 V	.54 V
.43 V	.47 V	.55 V
.43 V	.47 V	.59 V
.43 V	.47 V	.59 V
.43 V	.47 V	.63 V
.44 V	.48 V	.68 V
.44 V	.48 V	.71 V
.44 V	.48 V	.91 V

Selected measurements	Nb. readings	Mean	Std. dev.
Reliable VITRINITE de .35 à .7 %	53	.47	.07

Comments:

F.coals with yellow/orange spores and cuticles S.humic groundmass
 F.yellow groundmass with micro-org. S.resinite Botryococcus Tasmanacae bitumen
 Tri-maceral coals A.vitrinite;some mud additives



WELL : 25/5-3	Depth : 2810.00 M 2845.00 M
	Sample type : DE
	Preparation type : MO
	Specification :

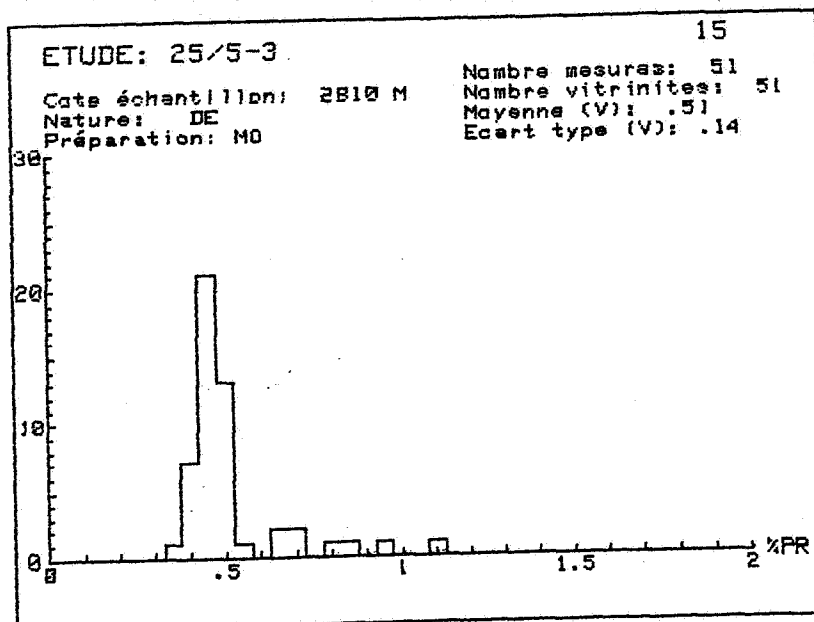
Measurements:

.37 V	.45 V	.50 V
.38 V	.45 V	.50 V
.40 V	.46 V	.51 V
.40 V	.46 V	.51 V
.41 V	.46 V	.51 V
.42 V	.46 V	.52 V
.42 V	.46 V	.52 V
.42 V	.46 V	.52 V
.43 V	.47 V	.53 V
.43 V	.47 V	.64 V
.43 V	.47 V	.65 V
.43 V	.47 V	.71 V
.43 V	.48 V	.72 V
.44 V	.49 V	.79 V
.44 V	.50 V	.85 V
.44 V	.50 V	.93 V
.44 V	.50 V	1.11 V

Selected measurements	Nb. readings	Mean	Std. dev.
Reliable VITRINITE de .35 à .55 %	43	.46	.04

Comments:

A.coal fragments with yellow/orange spores and cuticles R.Botryococcus
 F.yellow groundmass with green/yellow micro-organisms
 Tri-maceral coals A.vitrinite;some mud additives



ANNEXE B1.17

Maceral analysis of coals is a method frequently used by coal workers for characterizing their samples.

Using a point counter connected with the microscope stage, the method consists in expressing the percentage of the diverse coal components.

Five main classes of elements are generally counted : vitrinite, exinite and inertinite which are the three maceral groups of coal, pyrite and mineral fraction. For coals, the latter is generally negligible.

If necessary, for coal sedimentology studies or coal level correlations, more detailed analysis may be achieved using sub-maceral groups.

One thousand measuring points are needed for a good evaluation of the composition (especially for the less numerous elements).

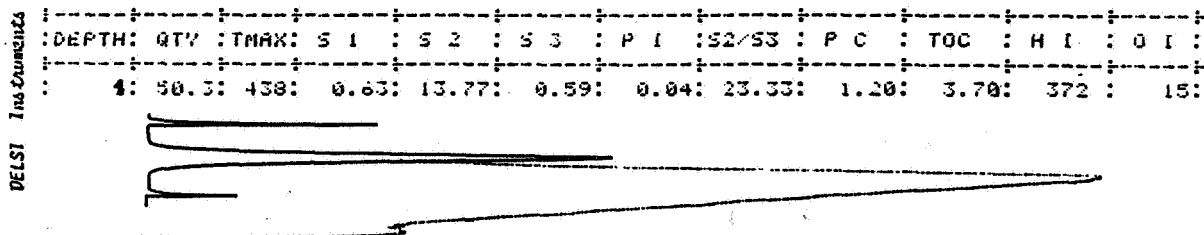
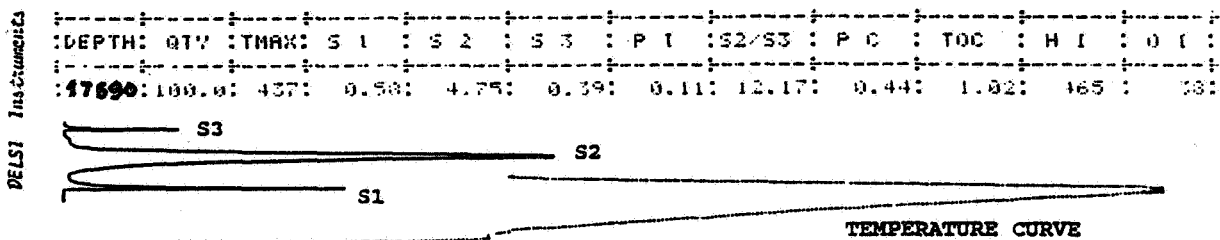
In oil exploration, this method provides good information about coal composition and its oil potential mainly through calculation of inertinite and exinite abundance, the determination of which is otherwise impossible to realize without any counting. Basically, inertinite is an oxygen rich maceral without any oil potential, on the contrary exinite is hydrogen rich and exhibits a good oil potential.

In addition, using an appropriate diagram (i.e. triangular diagram vitrinite-exinite-inertinite) it is possible to compare different coal samples or to classify them according to their composition.

LEGEND OF PYROGRAMS

ROCK-EVAL II DELSI INSTRUMENTS

Cycle I 3 min at 300 °C then 25 °C/min to 550 °C



- DEPTH : Replaced by the lab reference of the sample.
In order to check the reproducibility of the measurements a standard (usually ref 17690) is analyzed at intervals of some 10 samples. In case of samples with high organic carbon content we use another richer standard (ref 1).
- QTY : Sample weight in milligrams: On whole rock (RT) or insoluble residue (RI_RT) or extracted whole rock (RE) or insoluble residue of extracted rock (RI_RE).
- TMAX : Temperature at the maximum of the S2 peak (°C).
- S1 : Hydrocarbons volatilized at 300 °C during 3min (mg HC/g rock).
- S2 : Hydrocarbon-like products resulting from the cracking of heavy extractable compounds and kerogen between 300 and 550 °C (mg HC/g rock).
- S3 : CO2 trapped during the cracking of kerogen between 300 and 390 °C (mg CO2/g rock).
- PI : Production Index S1/(S1+S2).
- S2/S3 : Parameter related to the Hydrogen / Oxygen ratio of organic matter.
- PC : Pyrolysable Carbon = (S1+S2)*0.083. Part of organic carbon involved in the HC production through volatilization and cracking phases (% weight of rock).
- TOC : Total Organic Carbon in % weight of the sample used for the analysis (RT or RI_RT).
or
- IOC : Insoluble Organic Carbon in % weight of sample used for the analysis (RE or RI_RE).
- HI : Hydrogen Index (S2/OC)*100 (mg HC/g OC).
with OC = TOC or IOC
- OI : Oxygen Index (S3/OC)*100 (mg CO2/g OC).
- N.B.: When the analysis is carried out on insoluble residue the S1,S2,S3 values are recomputed relative to whole rock weight shown in the organic inventory analysis table.

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ANALYSTS

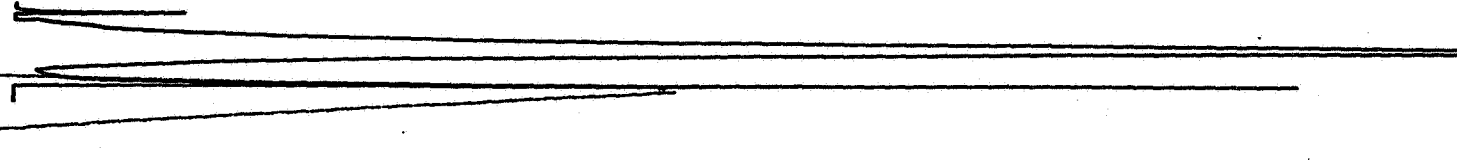
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : O T :
-----
:29286: 10.2: 428: 19.31:184.11: 1.76: 0.09:104.60: 16.95: 71.81: 256 : 2:

```



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ANALYSTS

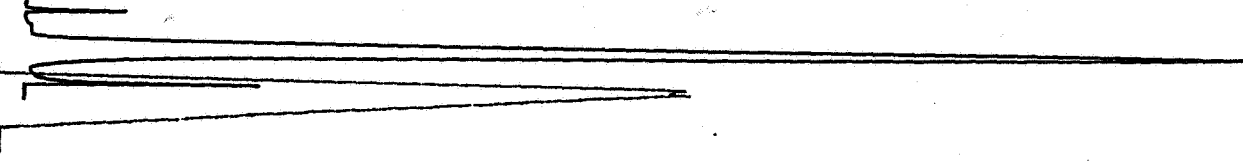
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : O T :
-----
:28872: 69.9: 423: 0.57: 14.04: 0.32: 0.04: 43.87: 11.01: 4.12: 340 : 7:

```



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ANALYSTS

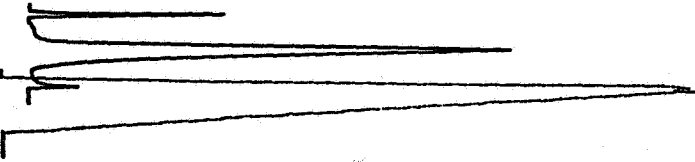
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : O T :
-----
:28832: 92.0: 422: 0.18: 4.48: 0.60: 0.04: 17.46: 0.30: 2.08: 215 : 28:

```



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ANALYSTS

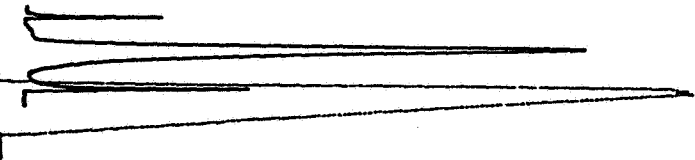
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : O T :
-----
:17690: 99.8: 438: 0.49: 4.71: 0.42: 0.09: 11.21: 0.43: 1.02: 461 : 41:

```



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ANALYSTS


CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : O T :
-----
:28870: 99.9: 57: 0.10: 0.88: 0.44: 0.10: 2.00: 0.08: 0.43: 204 : 102:

```



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ANALYSIS

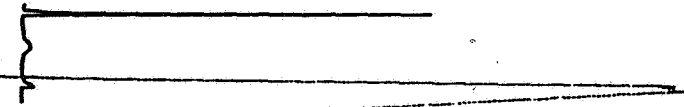
CYCLE : 1

SCALE = 1/30

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 :S2/S3 : P 0 : T00 : H T : O T :
-----
:28895:100.2: 426: 0.04: 0.18: 1.19: 0.18: 0.15: 0.01: 0.44: 40 : 270:

```



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ANALYSIS

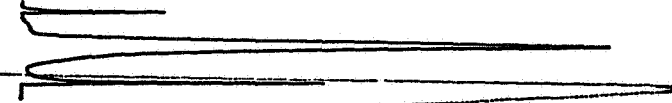
CYCLE : 1

SCALE = 1/30

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 :S2/S3 : P 0 : T00 : H T : O T :
-----
:17690: 99.7: 437: 0.53: 4.89: 0.37: 0.10: 13.21: 0.45: 1.02: 479 : 38:

```



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ANALYSIS

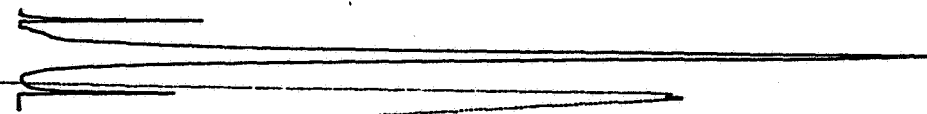
CYCLE : 1

SCALE = 1/30

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 :S2/S3 : P 0 : T00 : H T : O T :
-----
:28894: 49.6: 432: 0.64: 16.31: 1.00: 0.04: 16.31: 1.41: 7.82: 208 : 12:

```



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ANALYSIS

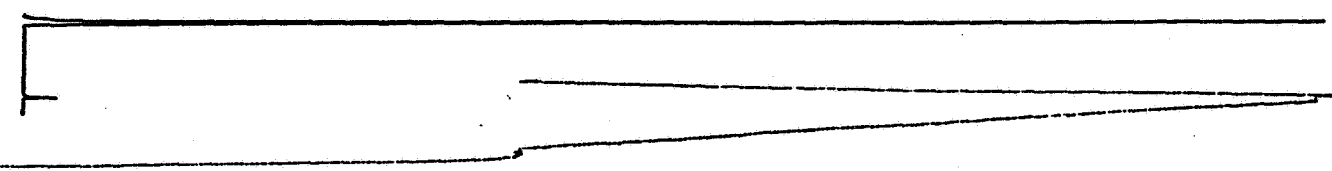
CYCLE : 1

SCALE = 1/30

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 :S2/S3 : P 0 : T00 : H T : O T :
-----
:28850: 92.7: 386: 0.03: 0.06: 4.48: 0.37: 0.01: 0.00: 2.16: 2 : 207:

```

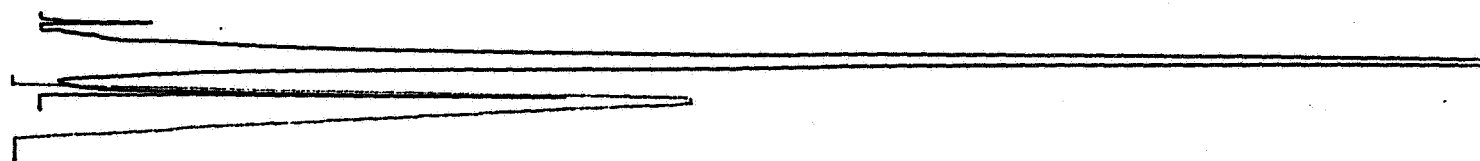


DATE: 31-07-90 ANALYSIS CYCLE : 1 SCALE = 1/32

```

-----
:DEPTH: RTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : D T :
-----
:28893: 13.7: 426: 7.88:135.10: 0.72: 0.06:187.63: 11.91: 42.06: 321 : 1:

```

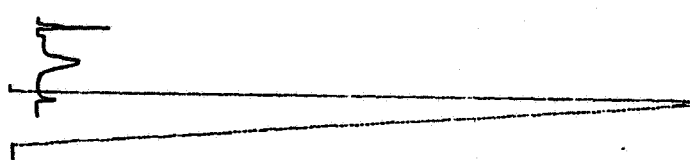


DATE: 30-07-90 ANALYSIS CYCLE : 1 SCALE = 1/32

```

-----
:DEPTH: RTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : D T :
-----
:28891: 99.6: 431: 0.06: 0.61: 0.18: 0.09: 3.38: 0.05: 1.12: 54 : 16:

```

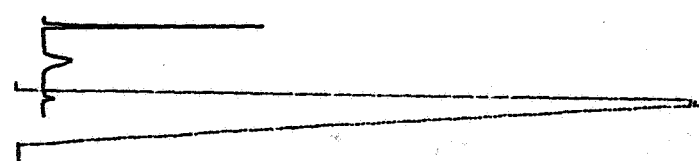


DATE: 30-07-90 ANALYSIS CYCLE : 1 SCALE = 1/32

```

-----
:DEPTH: RTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : D T :
-----
:28892:100.0: 431: 0.04: 0.28: 0.60: 0.12: 0.46: 0.02: 0.44: 63 : 136:

```

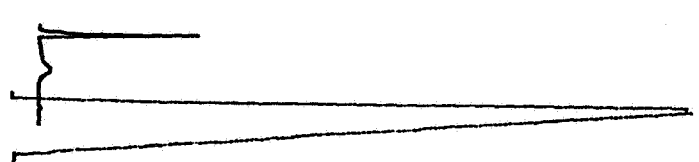


DATE: 30-07-90 ANALYSIS CYCLE : 1 SCALE = 1/32

```

-----
:DEPTH: RTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : D T :
-----
:28881: 99.7: 429: 0.02: 0.23: 0.44: 0.08: 0.52: 0.02: 0.54: 42 : 81:

```

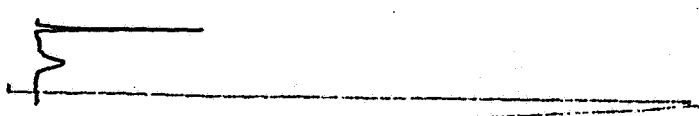


DATE: 30-07-90 ANALYSIS CYCLE : 1 SCALE = 1/32

```

-----
:DEPTH: RTV :TMAX: S 1 : S 2 : S 3 : P T : S2/S3 : P C : TDC : H T : D T :
-----
:28880:100.4: 429: 0.02: 0.38: 0.46: 0.05: 0.82: 0.03: 0.68: 55 : 67:

```



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ANALYSIS

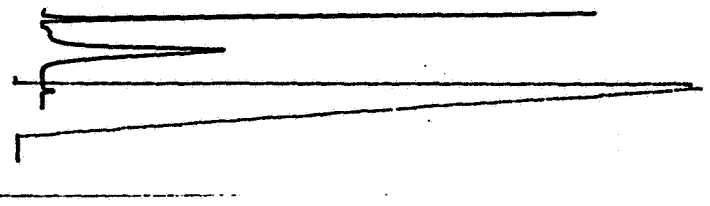
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 : S2/S3 : P 0 : T00 : H 1 : O 1 :
-----
:28844: 99.7: 435:  0.05:  1.58:  1.70:  0.03:  0.92:  0.13:  1.24:  127 :  137:

```



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ANALYSIS

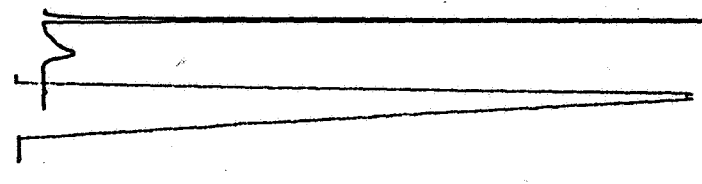
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 : S2/S3 : P 0 : T00 : H 1 : O 1 :
-----
:28879:100.2: 436:  0.00:  5.42:  0.00:  0.00:  0.07:  0.03:  0.67:   62 :  800:

```



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ANALYSIS

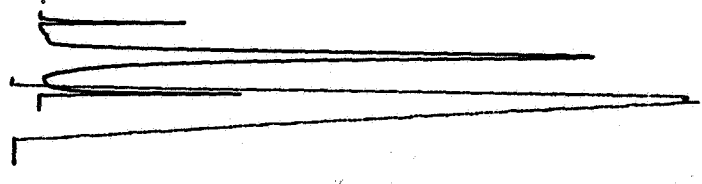
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 : S2/S3 : P 0 : T00 : H 1 : O 1 :
-----
:17690: 99.9: 440:  0.45:  4.71:  0.38:  0.09: 12.39:  0.43:  1.02:  461 :  37:

```



DATE: 30-07-90

ANALYSIS

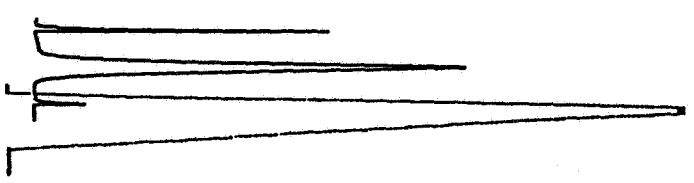
CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 : S2/S3 : P 0 : T00 : H 1 : O 1 :
-----
:28878: 84.1: 428:  0.09:  3.78:  1.02:  0.02:  3.70:  0.32:  2.13:  177 :  47:

```



DATE: 30-07-90

ANALYSIS

CYCLE : 1

SCALE = 1/32

```

-----
:DEPTH: DTV :TMAX: S 1 : S 2 : S 3 : P 1 : S2/S3 : P 0 : T00 : H 1 : O 1 :
-----
:28877: 83.5: 420:  0.23:  5.29:  0.45:  0.04: 11.75:  0.46:  2.31:  229 :  19:

```

