SNEA(P)
DIRECTION EXPLORATION
LABORATOIRE DE GEOLOGIE DE BOUSSENS
-
GEO/LAB Bss nº 2/2265 RP
/dm

3

25/4-5 WELL

(NORWAY)

-

OPTICAL STUDY OF ORGANIC MATTER

IN REFLECTANCE, FLUORESCENCE

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Boussens - April 1982

REFERENCE : ORDER N° 103103040

1 - GEO/LAB Bss n° 1/2151 RP

HEIMDALL 25/4-5 WELL (NORWAY) - Biostratigraphical report on Cretaceous Jurassic and Triassic series (3500-4357 m) -

J. DUCAZEAUX - J.L. VOLAT

2 - GEO/LAB Bss n° 2/2227 RP

25/4-5 WELL (NORWAY) - Sedimentological study of Jurassic deposits (from 3580 to 4340 m) -

R. CUSSEY

LISTE DE DIFFUSION

DESTINATAIRES :

Division Programmes PARIS à l'intention de l'Expert Régional EXPLO. EUROPE	1
EXPLO. DIG EUROPE	2
ELF-AQUITAINE NORGE s/c EXPLO. DIG EUROPE	12
DIVISION ETUDES ET SYNTHESES PARIS	1
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DIVISION ORIENTATIONS ET ZONES NOUVELLES PARIS	1
DIVISION ORIENTATIONS ET ZONES NOUVELLES PAU	1
S.I.D. BOUSSENS (Archivage)	2

A B S T R A C T

The whole section studied from Paleocene to Triassic is humic in facies with normal Vitrinite and frequent fluorescent Vitrinites ; palynofacies are also ligneous in transmitted light survey. Fluorescence is low and so are probably the source rock qualities.

The organic diagenesis, also with a good agreement between reflected and transmitted light, is medium in the Paleocene (0.5 % Ro), but steeply increases in the Jurassic 1 % Ro at its base, and reaches 1.25 % Ro in the Triassic. So the oil maturation zone is all covered by Mesozoic series.

S O M M A I R E

A N N E X E S

The well has been analyzed on a section from 2350 to 4304 m, comprising Paleocene, Cretaceous, Jurassic and top Triassic.

The analysis was based on 23 samples, including 6 cores and 3 side wall cores.

Lignitic mud additives are abundant in the cutting samples and the results obtained in reflectance are scattered due to the inconstant composition of Vitrinites.

1 - NATURE OF ORGANIC MATTER

The whole section studied consists of typically humic organic matter (from higher plants), including, in places, a few algal specimens of a lacustrine or marine origin (Botryococcus, Tasmanites), but never any true sapropelic groundmass. Fluorescence indexes are low, higher than 0.5 only in the Paleocene.

The concentrates of coal particles are not very rich and give histograms of reflectance measurements in a discontinuous vertical survey. One of these histograms, at 3100 m, is obviously reworked ; its composite coal composition also differs from the rest of the section.

Throughout the section, the composition of the coal fragments is almost the same, i.e. pure homogeneous Vitrinite (= Collinite), with rare exinitic inclusions (sporinite, cutinite, exsudatinite at 2350 m), generally devoid of Inertinite (except in the Statfjord formation). This Vitrinite is mostly of a very low fluorescence, which indicates a more hydrogenated composition and which is in keeping with its low and very inconstant reflectance.

Such a facies is still known in the Heimdall region (25/4-1), but generally it is associated with abundant exinites and high rates of fluorescence.

The source rock properties, as seen by the low fluorescence indices are probably very low although a few oil veinlets are visible (in the Dunlin fm. for instance).

.../...

2 - DIAGENESIS

The vertical survey of Vitrinite reflectance must be taken as an indication of minimal values in rank interpretation, due to its highly hydrogenated composition, but a small algal population supports the increase with depth of the true Vitrinite Reflectance. Hence, thanks to both these findings, the following progression can be assumed :

	depth		
Paleocene	2350 m	0.45 %	PRV + algae
	2500	0.55	" "
Brent fm.	3700	0.7-0.75	"
Dunlin fm.	3800	0.85	"
	3823	0.90	"
Statfjord fm.	3973	1	"
	4000	1.1	"
Cormorant fm.	4151	1.25	"

The TAI results (ref. 1) are consistent with this progression, at the following values :

3500 m	3
3800	3^+
3900	3^+
4100	4

3 - CONCLUSION

Throughout the section, the organic population, which is of the humic type and low fluorescent constitutes probably a low oil source rock. The rank increase with depth is steep and covers the whole of the oil maturation zone, reaching the gas-zone at the foot of the well.

elf aquitaine

NORWAY

DIRECTION GENERALE DES PRODUCTIONS

DIRECTION EXPLORATION

Mai 82
C.Palacios
D.7354

PL.1

25 / 4 - 5

ORGANIC MATTER
PETROLOGY

* Ro équivalent (Fluorescence)

REFLECTANCE
(measurements)

- Vitrinite
- Bitumens
- Fluorescent vitrinit

FLUORESCENCE
(global amount estimated)

- Fluorescent macerals
- Hydrocarbon traces in reservoirs
- Mud products

REFLECTANCE		FLUORESCENCE	
VITRINITE BITUMEN		GLOBAL ESTIMATED	ORGANIC MATTER NATURE
0	1	2% 1 2 3 4	

I.A.T.

2347

2350

Very low fluorescent vitrinite

- pale groundmass
- some haloes
- ε exsudatinite
- 1 botryococcus

MAUREEN

2500

*

- pale groundmass
- ε exinite
- 2 botryococcus (Ro : 0,55%)
- 1 tasmanacea (Ro : 0,55%)
- 1 acritarch

FORMATION

PALEOCENE

2659

2720

- pale groundmass

13 3/8"

2818

DANIAN

2900

- mud additives (cannel coals)

MAASTRICHTIAN

Composite coal

SHETLAND

3100

- ε sporinite

GROUP

CAMPANIAN

3258

3300

TURONIAN

3414

CENOMANIAN

3500

CROMER KNOLL GROUP

9⅝"

3590

3592

3620

SWC 3645

low fluorescent vitrinite

3

ε

d°

d°

ε

o

mud additives (cannel coals)

a few fluidal bitumens (brown)

HEATHER

KIM CL

3692

homogeneous vitrinite (low fluorescent) no inertinite

K10 3707,90

K11 3715,90

d°

ε

ε exinites

some haloes

d°

BRENT FORMATION

3+

JURASSIC

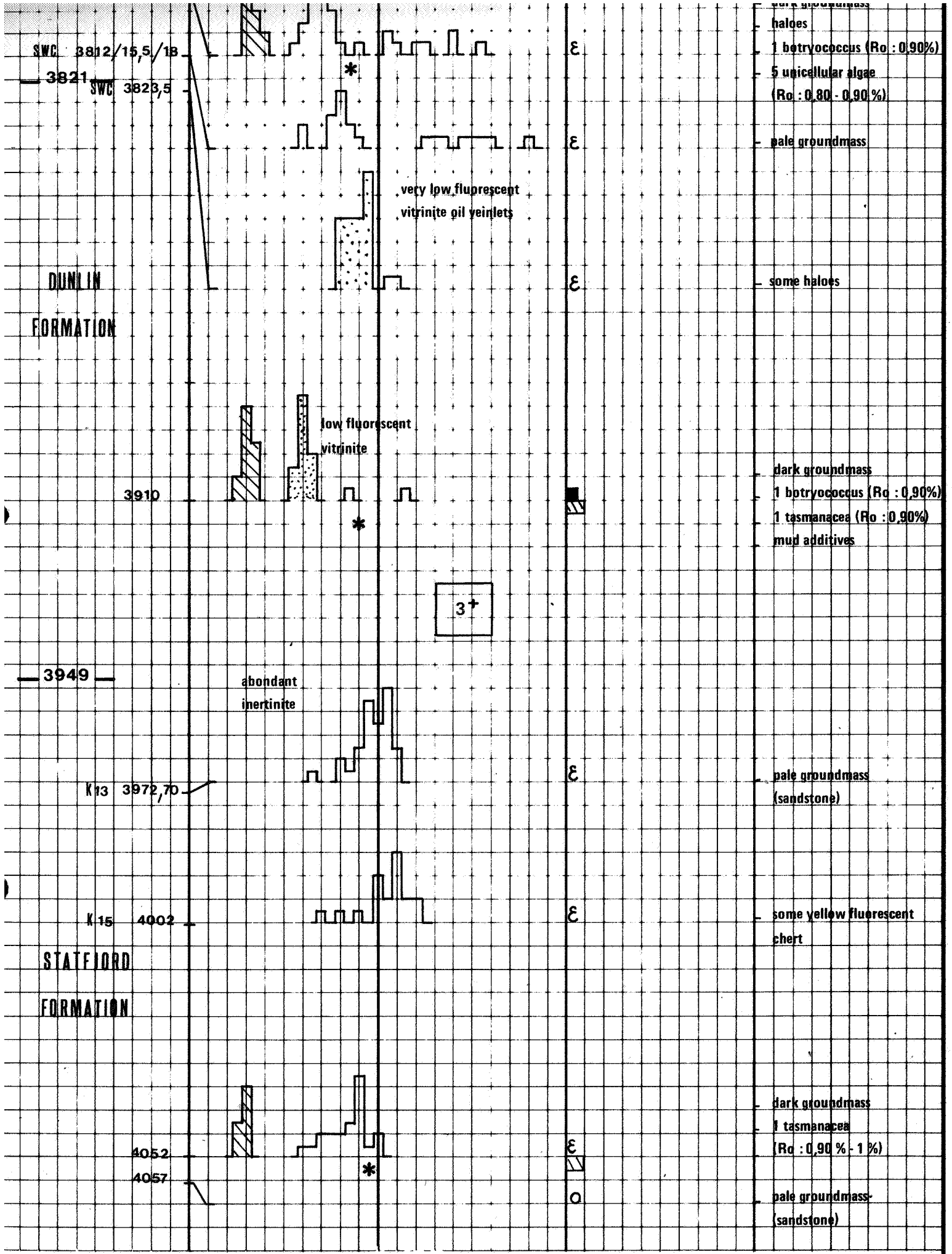
ε

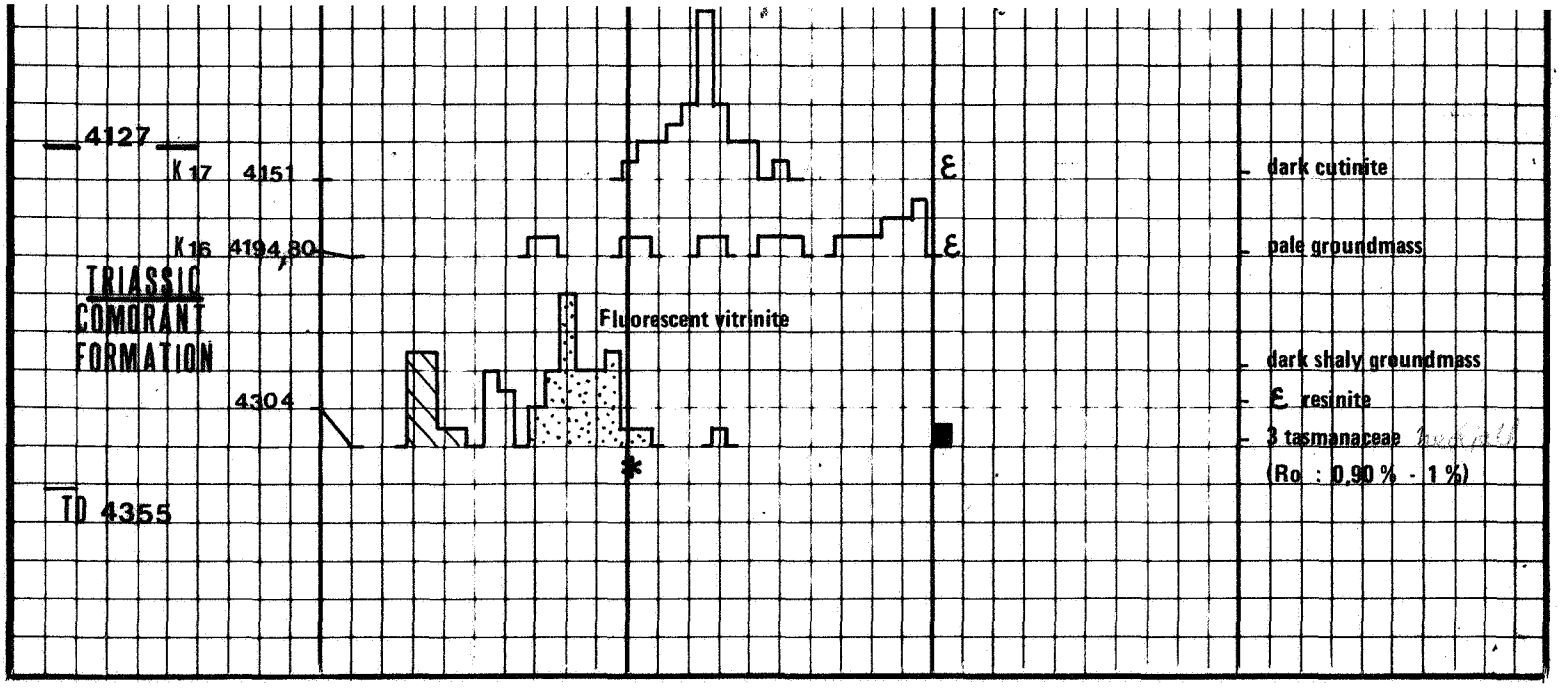
pale groundmass

SWC 3798,50 3806

(vitrinite not fluorescent).

dark groundmass


SWC 3812/15,5/18
3821
SWC 3823,5
halos
1 botryococcus (Ro : 0,90%)
5 unicellular algae
(Ro : 0,80 - 0,90 %)
pale groundmass
very low fluorescent
vitrinite oil veinlets
DUNLIN
FORMATION
some halos
low fluorescent
vitrinite
3910
dark groundmass
1 botryococcus (Ro : 0,90%)
1 tasmanacea (Ro : 0,90%)
mud additives
3+
3949
abondant
inertinite
K13 3972,70
pale groundmass
(sandstone)
K15 4002
some yellow fluorescent
chert
STATFJORD
FORMATION
4052
4057
dark groundmass
1 tasmanacea
(Ro : 0,90 % - 1 %)
pale groundmass-
(sandstone)


4127
K 17 4151
K 16 4194,80
TRIASSIC
COMORANT
FORMATION
4304
Fluorescent vitrinite
TD 4355
dark cutinite
pale groundmass
dark shaly groundmass
ε resinite
3 tasmanaceae
(Ro : 0,90 % - 1 %)