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LABORATOIRE DE GEOLOGIE DE BOUSSENS

GEO/LAB Bss N° 8/1663 RP

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Source Rock Study

CONFIDENTIEL
REPRODUCTION INTERDITE

30/7 - 3

(NORWAY)

OPTICAL STUDIES OF ORGANIC MATTER

(between 3 100 and 4 040 m)

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Boussens - July 1978

Reference : Order N° 031108

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NORWAY

14

A B S T R A C T

The whole series studied are Cretaceous in age.

No reliable data is available in the 3 100 to 3 600 m interval, analysed only in reflected light, due to the bad quality of the cutting samples.

The 3 600 to 4 040 m (well bottom) interval, analysed in reflected and in transmitted light, is in the main oil generation zone. Its palynofacies are mainly made up of black ligneous particles.

C O N T E N T

	Page
1 - Introduction	1
2 - Study in reflected light	1
3 - Study in transmitted light	2
4 - Conclusions	3

Plates :

- 1 - Location maps
 - 2 - Organic matter petrology
 - 3 - Organic matter study - Synthesis of results
-

1 - INTRODUCTION

This report presents the results of the optical studies of the organic matter :

- in reflected light on 15 cutting samples between 3 113 and 4 037 m (results in plate 2) ;
- in transmitted light on 12 cutting samples, 1 core fragment and 13 sidewall cores, between 3 608 and 4 040 m. The palynofacies have already been given in the "biostratigraphical report" * ; the Thermal Alteration Index have been estimated on the same samples for the present report.

The main results of these optical studies are summarized in plate 3.

2 - STUDY IN REFLECTED LIGHT (3 113 - 4 037 m)

The results obtained in concentrating organic particles, although appearing well on the diagram are quite bad and not reliable, because they consist almost entirely of coaly mud products.

Bulk results in reflected light and fluorescence

The abundant, continuous population observed from top to bottom of the studied section, belongs to the same type of lignite, well provided in sporinite, cutinite, sometimes fluorinite ; such a typical "cannel coal", frequently associated with nut shells , is probably similar to the "ligcon" samples recently analysed, from North Sea drilling (U.S. and U.K. "ligcon"); also nut shells are mud typical additives.

This material can be recognized thanks to fluorescence observation, better checking sporinites and nut shells ; in addition, the reflectance diagram gives the same mean value 0,30 % for Vitrinite (Huminite) in the section (about 1 000 m), which would be impossible with reliable vitrinite at such depths.

The only reliable results obtained in the section are some fluorescence on reservoirs, in a small amount at 3 570 and greater amount at 3 760 m.

Discussion on the quality of sampling

These worthless results have to be explained.

.../...

(*) J. Ducazeaux in 7/1523 Report June 77

The studied samples consist only of drill cuttings. Nevertheless, the principle of studying cuttings is not to be questioned ; this well is, for us, an extreme case for sampling : the available samples were between 5 and 25 g. in weight, including drilling mud and resulted in very small amount of rock cleaning.

Some special trials have been carried out, so as to check the results obtained here : 4 samples have been analysed again (mixtures of 3 or 4 neighbouring samples) after hand sorting under a small microscope, in order to divide them into 2 lots 1. rock - 2. coal.

The coal part only consists of mud products with a constant reflectance 0,25 - 0,30 %. The very poor rest of the sample gives the following results :

3 300 m : reddish fluorescent shale ;

3 500 m : - dark red fluorescent shale with small filament algae,
- sandstone with a lacustrine alga, very dark in fluorescence
(due to diagenesis ? or reworked ?) ;

3 800 m : reddish fluorescent shale ;

4 030 m : reddish fluorescent (very pale) ;

(# due to cuttings mixture).

These data are not quite determinant (too small number of grains) and a reflectance survey is not possible.

3 - STUDY IN TRANSMITTED LIGHT (3 608 - 4 040 m)

Palynofacies

The palynofacies are mainly made up of black ligneous particles and of unidentified black debris in the whole studied interval ; they contain a small amount of amorphous matter in the 3 608 - 3 630 m interval (< 30 %) and of divided blackish amorphous matter in the 3 720 - 3 737,5 interval.

Thermal Alteration Index

The TAI are estimated as follows :

.../...

about 3 in 3 608, 3 620, 3 630 SWC
 3-3-5 in 3 636 SWC
 3.5 (4) in 3 648-3 654 SWC
 4 in 3 658-3 661 SWC
 about 3.5 in 3 704-3 715 SWC
 about 3 in 3 734-3 737.5 SWC
 3.5 (4) in 3 748.5-3 754.5 SWC
 3.5 in 3 785 SWC
 3.5 in 3 936.8 core 1
 3.5 (4) in 4 040 cuttings

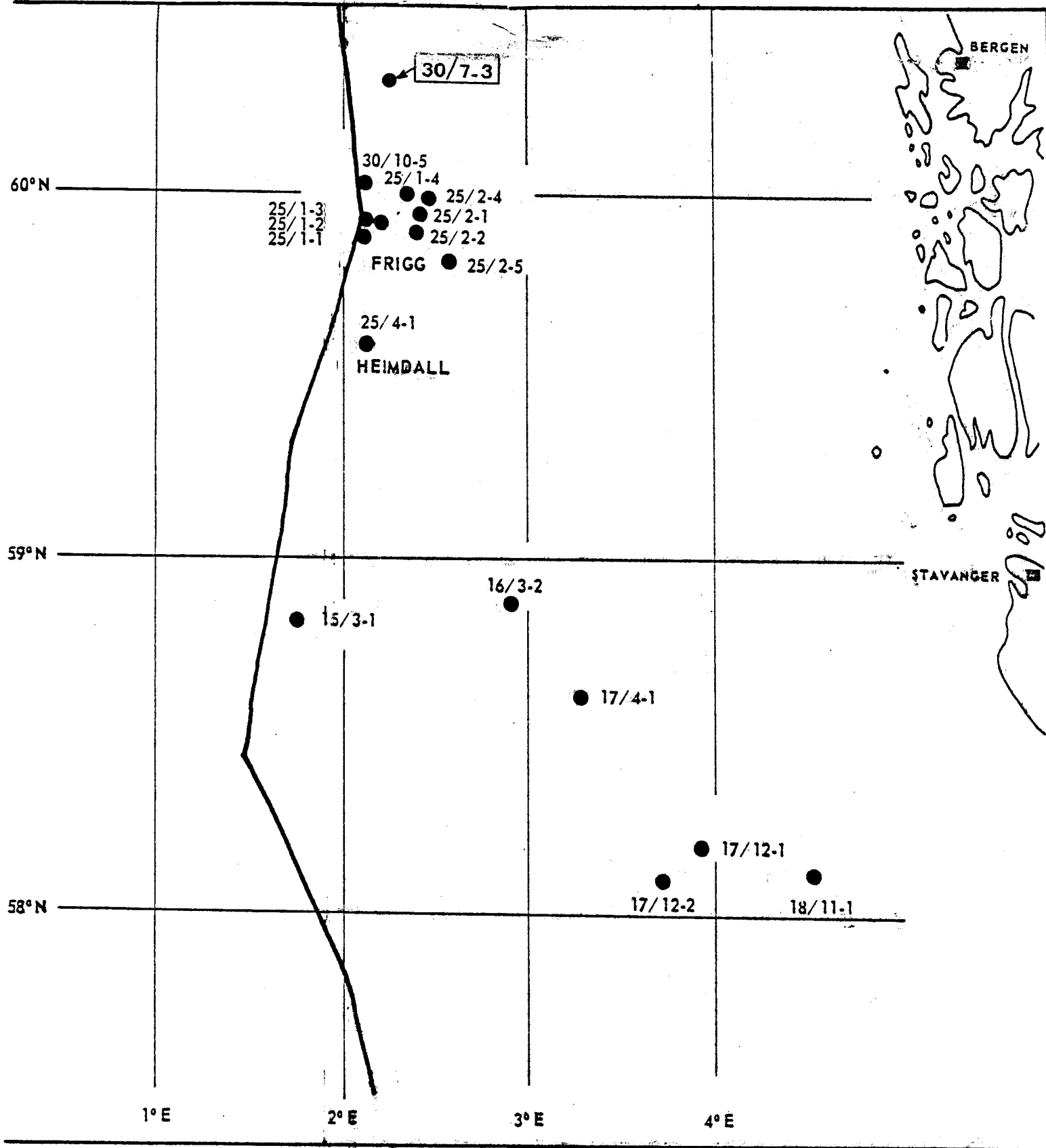
These TAI values show that the 3 608 - 4 040 m interval is in the main oil generation zone. This conclusion is not in agreement with the interpretation given by GEOCHEM*, which indicates that the series from 30/7 - 3 are immature or at the beginning of the oil window, but this interpretation is based on geochemical and optical analyses (reflected light) carried out only on cutting samples, which are contaminated.

4 - CONCLUSIONS

The optical study of organic matter in reflectance-fluorescence is quite negative due to very poor cutting sampling, in addition polluted by coaly mud products.

The optical study of organic matter in transmitted light (palynology), carried out on several sidewall cores and one core fragment, gives good results. It shows that the Cretaceous section between 3 608 and 4 040 m is in the main oil generation zone ; the polynofacies of this interval are mainly made up of black ligneous particles.

(*) Geochem Laboratories (U.K.) Limited : "Geochemical evaluation of North hydro's 30/7 - 3 wall, Norwegian North Sea," - December 1976



Elf aquitaine	Pays	NORVEGE
	Pourcentage des permis	tous permis
DIRECTION GENERALE DES PRODUCTIONS		
DIRECTION EXPLORATION		
Date		
Auteur		
N° Classif. A. 2679		
FL.1		
<div style="text-align: center;"> 30/7-3 LOCATION MAP </div>		

elfaquitaine

NORVEGE
Norsk Hydro

DIRECTION GENERALE DES PRODUCTIONS

30/7-3
ORGANIC MATTER

PETROLOGY

DIRECTION EXPLORATION

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PL. 2

REFLECTANCE
(measurements)

FLUORESCENCE
(Global amount estimated)

Vitrinite
Bitumens

Fluorescent macerals
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 3%

1 2 3 4 5

3113
3150

3180
3210

3240
3280

3300
3350

3370
3410

3430
3480

3500
3550

3608
3570
3610

CONIACIAN
TURONIAN

3640
3630
3680

3700
3740

TURONIAN

3740

9 5/8 3760
3782 3810

3830
3880

CENOMANIAN

3910
3900
3950

ALBIAN

3960
4000

4005
4037

4040

mud products, lignon
typed (sporinite
cutinite, fluorinite)

d⁺

d⁺ + nutshells

d⁺

d⁺

d⁺

d⁺

fluorescent reservoirs

d⁺

d⁺

fluorescent reservoirs

d⁺

DEPARTEMENT LABORATOIRE DE GEOLOGIE
DE BOUSSENS

SYNTHESIS OF RESULTS

COUNTRY : NORWAY

Date June 1978

