MEMO. NO. 2152

SPORE COLOURATION ANALYSIS OF SIXTEEN SAMPLES FROM THE NORSK HYDRO 30/7-6 NORWEGIAN NORTH SEA WELL

ROBERTSON RESEARCH GROUP

ROBERTSON RESEARCH INTERNATIONAL LIMITED

MEMO. NO. 2152

SPORE COLOURATION ANALYSIS OF SIXTEEN SAMPLES FROM THE NORSK HYDRO 30/7-6 NORWEGIAN NORTH SEA WELL

Project No. IIA/778/1161

I

INTRODUCTION

The maturation of kerogen during diagenesis has been described by a number of workers, of whom Correia (1967 and 1971), Staplin (1969) and Gutjahr (1966) have referred specifically to modifications of sporopollenin. One effect of maturation processes on sporopollenin is to increase the visible colour density from pale yellow, through orange and brown to black. The determinative procedures outlined by Staplin (1969) have been largely followed in this study, except that a ten-point scale of colour indices has been utilised rather than the scale proposed by Staplin. This is considered to provide a more consistent colour index : temperature relationship.

Sixteen samples from the interval 3490m - 3775m of the Norsk Hydro 30/7-6 Norwegian North Sea well were prepared for spore colour analysis. The results of the examination and our interpretation of these results are presented below.

II

RESULTS

The results of spore colouration analysis may be grouped into

intervals of zones of maturity. Within certain of these zones anomalous results have been observed as described below:

INTERVAL 3490m-3620m

Spore colouration values in this section range from 3.5 to 4.5 and are indicative of marginally to early mature sediments. Wide ranges of spore colour values were noted with indices as high as 5.5.

INTERVAL 3635m-3705m

The samples from this interval are characterised by extremely variable spore colour values, although the average value of in situ material is 4.5-5.5. This value is indicative of mature sediments.

SAMPLE 3720m

It has not proved possible to produce an accurate assessment of the maturation level of this sample, as insufficient positively in situ palynomorphs were recorded. A value of +5 is determinable from the available sporopollenin, indicative of mature sediments.

INTERVAL 3735m-3775m

Although variable spore colouration values were again recorded from this section, with some indices as high as 8, the overall spore colouration values average 5.5 to 6.5. This is indicative of well mature sediments.

III

CONCLUSIONS

The results of these analyses suggest that the section is organically mature below +3600m, and that at the base of the interval examined post-mature sediments have not been penetrated.

High variations in spore colour values, as observed in this well, are commonly attributed to localised heating, such as hydrothermal activity in aquifers. The maturation gradient indicates an unusually rapid increase in temperature relative to depth. From the available evidence it has not been possible to identify the cause of this phenomenon.

CND/pth
23.6.77.