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REPORT TITLE/ TITTEL

VITRINITE REFLECTANCE OF 5 SIDEWALL CORE SAMPLES (COALS) FROM WELL 34/10-16 (BETWEEN 3232 AND 3336 METRES DEPTH)

CLIENT/ OPPDRAGSGIVER

Statoil

RESPONSIBLE SCIENTIST/ PROSJEKTANSVARLIG

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SUMMARY/ SAMMENDRAG

Supplement to well 34/10-16.

KEY WORDS/ STIKKORD

Coal	34/10-16
Oxidation	Vitrinite reflectance

VITRINITE REFLECTANCE OF 5 SIDEWALL CORE SAMPLES (COALS) FROM WELL 34/10-16 (BETWEEN 3232 AND 3336 METRES DEPTH)

Introduction

Five coal samples from well 34/10-16 were prepared by normal techniques for vitrinite reflectance and spore fluorescence colour analysis.

Due to a very poor kerogen type throughout most of well 34/10-16 (generally type IV-reworked vitrinite and/or inertinite) the original vitrinite reflectance analyses on this well were of poor quality in terms of amount of vitrinite fragments measured and therefore reliability of the statistical (mean) parameter. Only below about 3550m was nearly enough vitrinite located on an average service work whole rock preparation block within a reasonable time or after complete scanning.

A request for cored material or sidewall cores was not met for the original source rock analysis report deadline. However, subsequently, 5 sidewall cores from a narrow interval were supplied for vitrinite reflectance only.

The coals were very different from each other in terms of maceral content indicating environment or input variations over a short range, and two showed positive signs of oxidation (though relatively mild and only manifesting itself in the form of partial pyrite decomposition and occasional shrinkage cracks). These two samples had notably higher reflectance values than the other three.

The remaining three samples would indicate an average reflectance for this section of approximately 0.6% Ro. Reference to the original analyses for the source rock analysis report shows that the value from the coal (0.6%) is somewhat higher than the samples immediately above and below this section (0.55%) disregarding the lignite additive sample from 3110-3140m. However, in the conclusion of the report, zone F, (which ranges from 3020-3790m and within which these coals are found), is allocated a maturity of 0.55-0.6% Ro i.e. borderline oil window maturity at its base.

The addition of the results from these coals (when possible oxidation of two samples is accounted for) shows a clear jump in values on a reflectance vs depth plot but has little effect on the overall trend, possibly resulting in a slight but not significant increase in bottom hole maturity (such an increase would be insufficient to imply that the sequence had gone from top oil window maturity to peak oil generation maturity for example).

A final consideration is that in several North Sea wells the reflectance of vitrinite in coals has been notably higher than in surrounding sediments. This has been given several possible explanations (increased reflectance due to oxidation, misidentification, difficulty in obtaining large enough clear vitrinite fragments in sediments etc.) and the differences, found in this well are by no means amongst the most severe.

Whilst the unsolved question of reflectances associated with coals being higher than surrounding sediments is puzzling and should be further investigated it is felt that any in-situ coals should be automatically chosen and used for Vitrinite Reflectance analyses especially if they are cored or taken as side wall cores. These will in any event aid in the identification and elimination of low rank lignite when occurring in additive and found below higher rank coals (especially if as frequently happens the organic geochemist has no recourse to even rough stratigraphy or logs to clear up such a problem and as sometimes lignite and higher rank coal may be added to drilling muds) and will also give a theoretical maximum reflectance for the depth at which they occur.

Some coals will also give a check of the fluorescence parameters as this has not been observed to be higher in coals than in associated sediments. The additional sidewall core samples examined for this well are described below.

Sample A-6674, 3232.59-3232.70m); Coal, Ro = 0.58(20)
The coal is a normal coal with a good distribution of macerals but no large areas of one single maceral (including vitrinite). There are abundant spores and some disseminated micrinite. There is very little pyrite. The values have an excellent statistical distribution. A rich content of mid-orange spores is seen in ultra-violet light.

Sample A-6675, 3262.73-3262.84m; Coal, Ro = 0.71(21)
This coal is very dominantly vitrinite occurring as large, almost pure, masses. There are a few spore or inertinite-rich areas within the vitrinite and there is a variable detrital content. The coal has possible signs of oxidation (pyrite decomposition and subsequent holes together with shrinkage cracks). A low to moderate content of mid-orange spores is seen in ultraviolet light.

Sample A-6676, 3287.41-3287.52m; Coal, Ro = 0.62(25)
This is a variable but generally well banded coal. There is a high inertinite content. A low to moderate content of mid-orange spores and resin is seen in ultra-violet light.

Sample A-6677, 3298.16-3298.27m; Coal, Ro = 0.68(25)
This is a normal coal but with a moderate to high inertinite content. There are possible signs of oxidation (i.e. some pyrite is decomposed but some is fresh). Mid-orange fluorescence is seen from a low to moderate spore content and green fluorescence from resin.

Sample A-6678, 3335.25-3335.36m; Coal, Ro = 0.62(25)
This is a moderate coal in which the vitrinite appears duller and easier to distinguish from semi-fusinite than in the other coals in the sequence. There is a variable but moderately high exinite and detritus content. This is one of the better coals with oxidation (as seen from pyrite decomposition) very mild and apparently concentrated in selected bands. A moderate content of spores and resin displaying mid-orange fluorescence.

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WELL 34/10-16

TABULATION OF MATURITY DATA

IKU No.	DEPTH (m/ft)	VITRINITE REFLECTANCE Ro(%) and Counts		MATURATION INDEX (TAI)	FLUOR-ESCENCE
A 6674	3232.70	0.58(20)		N.A.	6
		COAL	–		
A 6675	3262.84	0.71(21)		N.A.	6
		COAL	–		
A 6676	3287.52	0.62(25)		N.A.	6
		COAL	–		
A 6677	3298.27	0.68(25)		N.A.	6
		COAL	–		
A 6678	3335.36	0.62(25)		N.A.	6
		COAL	–		
				N.A.=not analysed	
				6=mid-orange spores	

DATE : 6 - 7 - 83.