L-100 ARKIVERES. 725.5 1/5-2X.

INTER-OFFICE CORRESPONDENCE / SUBJECT:
BARTLESVILLE, OKLAHOMA

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Visual Maturity of Additional Selected Cuttings Samples from the Flyndre 1/5-2X and the 8/11-1 Wells, Group License Area, Norwegian North Sea.
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Summary

Ten selected cuttings samples from the Flyndre 1/5-2X and the 8/11-1 wells were examined for their source rock potential. The data and interpretations presented herein will be utilized in a larger source rock study of the Group License Area that is currently being prepared.

Visual maturity based on vitrinite reflectance measurements and thermal alteration indices allows the following thermal maturation groups to be established (see Figs. 1, 2 and Tables 1, 2).

FLYNDRE 1/5-2X WELL

4,890 - 7,190 ft. - Immature to Early Oil Window
8,990 - 13,500 ft. - Early to Mid Oil Window
13,500 - 14,000 ft. - Late Oil Window

8/11-1 WELL

4,020 - 4,200 ft. - Immature
5,970 - 8,190 ft. - Early Oil Window
9,220 - 10,600 ft. - Late Oil Window

Discussion

Selected cuttings samples from the Flyndre 1/5-2X and the 8/11-1 wells were examined for thermal maturity using vitrinite reflectance measurements and thermal alteration indices. In a previous study by this author (EPS Report No. 2643A) samples from the 1/5-2X, 8/11-1 and other wells in the Group License Area were examined; the results from the former analyses were considered in the preparation of the present

report. Vitrinite reflectance measurements and thermal alteration indices are discussed for the following maturity groups.

FLYNDRE 1/5-2X WELL

Interval: 4,890-7,190 ft.
Maturity: Immature to Early Oil Window

Vitrinite reflectance measurements (Ro = 0.48 to 0.49) and thermal alteration indices (TAI = 2 to 2+) indicate that the examined intervals, 4,890-5,070 and 6,980-7,190 ft. are immature or at the very earliest stage of the "oil window". Neither oil nor thermally-generated gas is expected to be produced at the present levels of maturity.

Interval: 8,990-13,500 ft.
Maturity: Early to Mid Oil Window

This interval can be placed in the early to mid oil window based on vitrinite reflectance measurements (Ro = 0.84) and thermal alteration indices (TAI = 2+ to 3-). In the intervals 8,990-9,170 and 11,510-11,560 ft., only TAI values were obtainable, the vitrinite populations being too sparse or unreliable to be measured. Both vitrinite measurements (Ro = 0.84) and spore coloration values (TAI = 3-) obtained for the interval 13,400-13,500 ft. indicate that the main phase of oil generation has been reached.

Interval: 13,500-14,000 ft.
Maturity: Late Oil Window

This interval has reached the latest stage of the main oil generating phase based on TAI values (3) and vitrinite reflectance measurements (Ro = 0.94 to 1.10). In a former study by this author (EPS Report No. 2643A), an Ro value of 1.17 was established for the interval 13,790-13,870 ft. In the present study, additional sample control both above and below the 13,790-13,870 ft. interval allows editing out some of the high vitrinite measurements thereby lowering the mean Ro value of this interval to 1.10.

The main phase of oil generation has been passed; only condensate, wet gas or gas should be generated from this interval at its present thermal regime.

8/11-1 WELL

Interval: 4,020-4,200 ft.
Maturity: Immature

The interval 4,020-4,200 ft. is immature according to vitrinite reflectance measurements (Ro = 0.36) and thermal alteration indices (TAI = 2-). Neither oil nor thermally-generated gas is expected to be generated at the present thermal regime.

Interval: 5,970-8,190 ft.
Maturity: Early Oil Window

The intervals 5,970-6,180 and 7,950-8,190 ft. have reached the early stage of the main oil generating phase based on vitrinite reflectance measurements (Ro = 0.50 to 0.60) and spore coloration values (TAI = 2 to 2+). Little oil or gas generation is expected at the present thermal regime.

Interval: 9,220-10,600 ft.
Maturity: Late Oil Window

This interval is considered to have reached the late stage of the main oil generating phase based on high Ro values (0.97-1.05) and TAI values (3-). Some condensate, wet gas and gas could be expected from the present thermal regime.

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FLYNDRE 1/5-2X NORWEGIAN NO. SEA
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INTERVAL (FEET) TOP	BASE	TYPE	TAI	NORMALIZED TO 100% BY VOLUME (LIQUID PRONE) EXI-NITE	ALGI-NITE	(GAS PRONE) VITRI-NITE	INERTI-NITE	RO MEAN	STND. DEV	MODE	RANGE LOW	HIGH	NO.OF VIT. READINGS	TOTAL ORGANIC CARBON (WT %)
4890.	5070.	CC	2					0.49	0.10	0.59	0.37	0.76	24	
6980.	7190.	CC	2+					0.48	0.08	0.44	0.35	0.72	59	
8990.	9170.	CC	2+											
11510.	11560.	CC	2+											
13400.	13500.	CC	3-					0.84	0.13	0.83	0.52	1.01	12	
13500.	13600.	CC	3					0.94	0.22	0.87	0.62	1.26	11	
13790.	13870.	CC	3	2.	93.	3.	2.	1.10	0.15	1.12	0.74	1.41	26	2.76
13900.	14000.	CC	3					1.02	0.15	0.90	0.80	1.28	11	

TERMINOLOGY USED FOR SOURCE ROCK PLOT

TAI = THERMAL ALTERATION INDEX (SPORE COLOR) (1-2 YELLOW) (2-3 BROWN) (3-4 DARK BROWN) (5 BLA
EXINITE = POLLEN AND SPORE EXINE + PLANT CUTICLES + RESINS + OTHER STRONGLY FLUORESCENT ORGANIC MATER
+ AMORPHOUS HERBACEOUS (IF RECOGNIZABLE AS FROM TERRESTRIAL SOURCE - IF NOT IT IS RECORDED
UNDER ALGINITE)
ALGINITE = (ALGAL DEBRIS - CYSTS AND BODIES) + AMORPHOUS SAPROPEL
VITRINITE = WOODY TISSUE (ALTERED TO HUMIC COMPOUNDS) + NONFLUORESCENT STRUCTURED TRANSLUCENT MATERIAL
INERTINITE = COALY MATERIAL INCLUDING FUSINITE, SEMIFUSINITE, PSEUDOVITRINITE, MACRINITE, & INERTODETRIN
* RATIO = EOM / (1.25 * TOC)

TABLE 1
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S. D. MIILLER 8/11-1 NORWEGIAN NO. SEA
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INTERVAL (FEET) TOP	BASE	TYPE	TAI	NORMALIZED TO 100% BY VOLUME (LIQUID PRONE) (GAS PRONE) EXI-NITE	ALGI-NITE	VITRI-NITE	INERTI-NITE	RO MEAN	STND. DEV	MODE	RANGE LOW	RANGE HIGH	NO. OF VIT. READINGS	TOTAL ORGANIC CARBON (WT %)
4020.	4200.	CC	2-					0.36	0.10	0.32	0.20	0.54	29	
5970.	6180.	CC	2					0.50	0.11	0.53	0.25	0.81	65	
7950.	8190.	CC	2+					0.60	0.15	0.49	0.40	0.88	9	
9220.	9300.	CC	3-	10.	65.	15.	10.	0.97	0.26	0.94	0.50	1.51	64	2.56
10120.	10130.	CC	3-	10.	75.	10.	5.	1.00	0.16	1.02	0.66	1.29	38	1.23
10140.	10190.	CC	3-	10.	60.	20.	10.							0.85
10500.	10600.	CC	3-	10.	60.	20.	10.	1.05	0.19	1.21	0.67	1.36	27	0.76

TERMINOLOGY USED FOR SOURCE ROCK PLOT

TAI = THERMAL ALTERATION INDEX (SPORE COLOR) (1-2 YELLOW) (2-3 BROWN) (3-4 DARK BROWN) (5 BLA
EXINITE = POLLEN AND SPORE EXINE + PLANT CUTICLES + RESINS + OTHER STRONGLY FLUORESCENT ORGANIC MATER
+ AMORPHOUS HERBACEOUS (IF RECOGNIZABLE AS FROM TERRESTRIAL SOURCE - IF NOT IT IS RECORDED
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* RATIO = EOM / (1.25 * TOC)

TABLE 2
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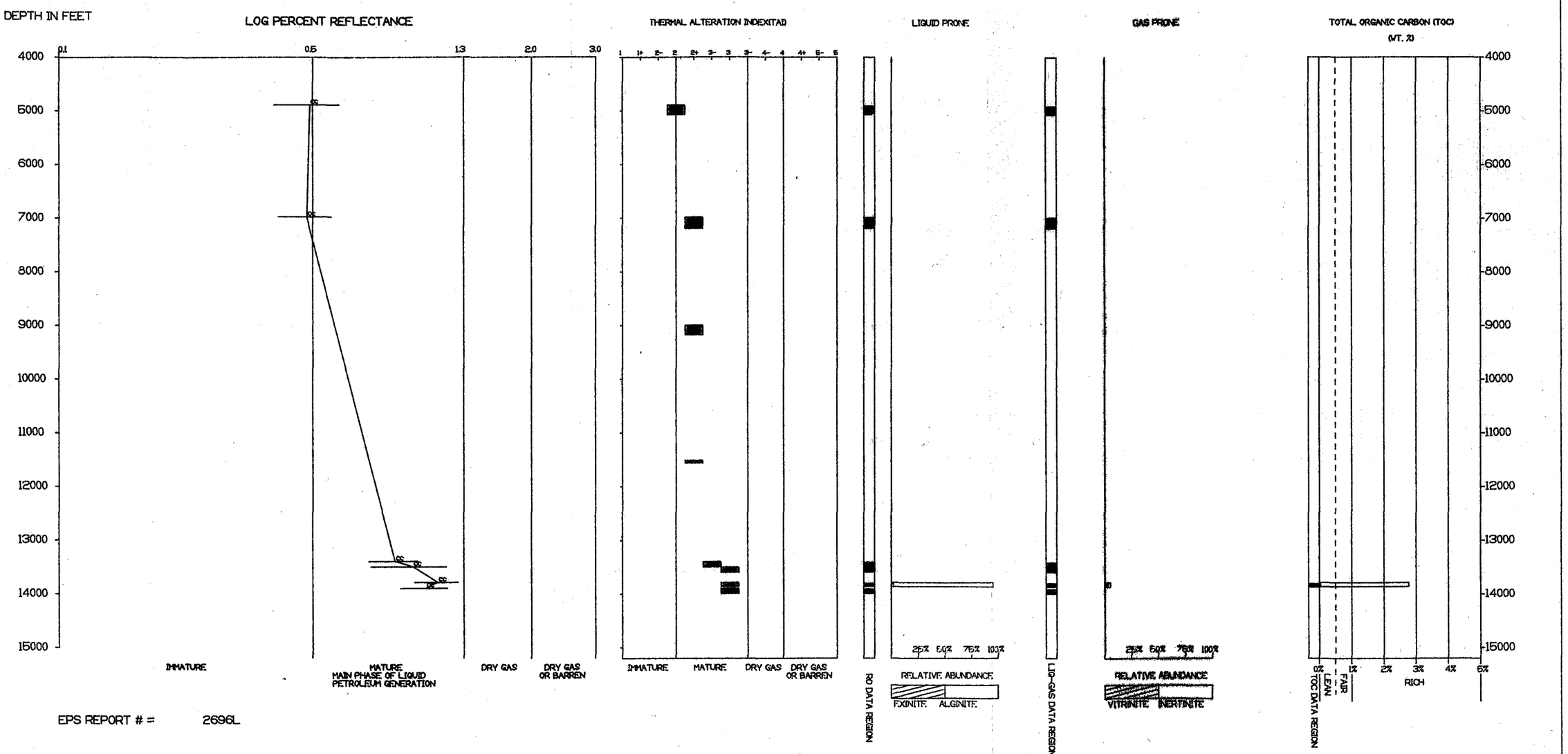
THERMAL ALTERATION AND $OURCE ROCK POTENTIAL OF FLYNDRE 1/5-2X NORWEGIAN NO. SEA

FIGURE 1



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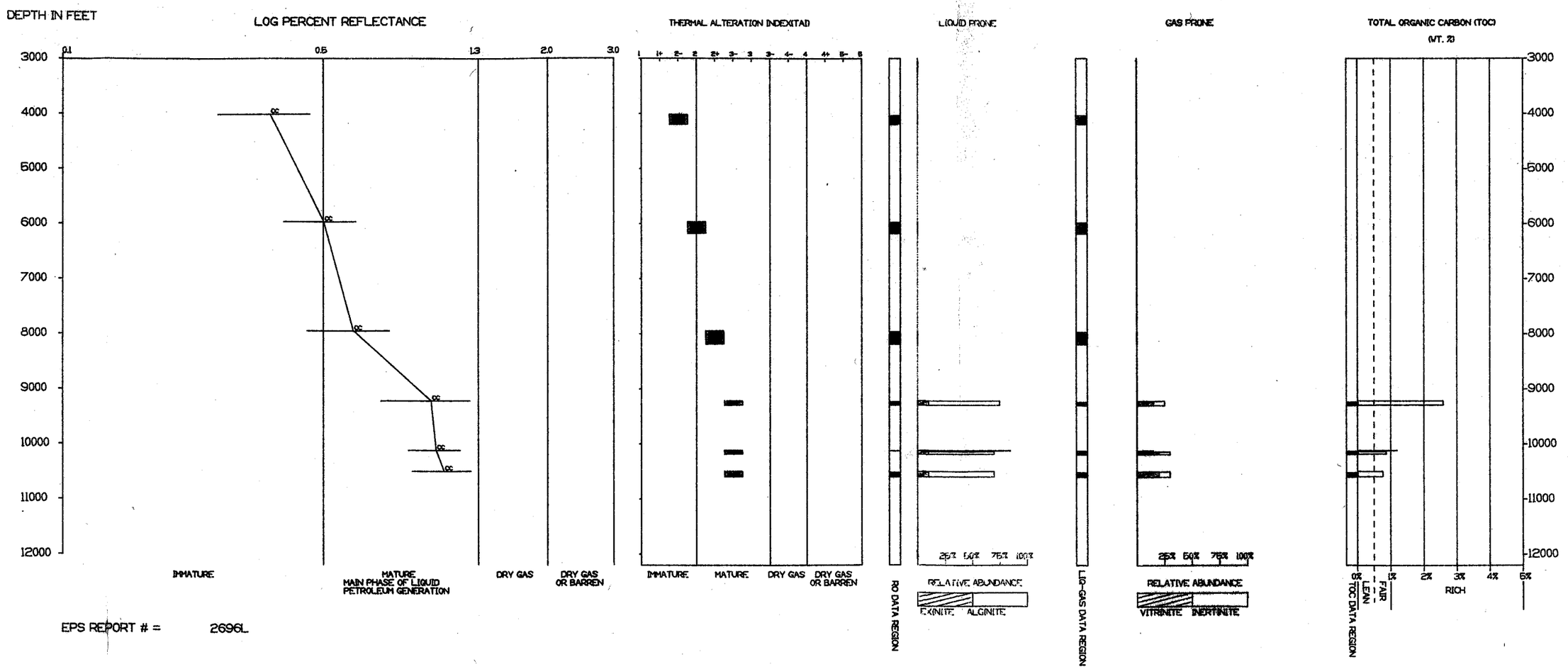
THERMAL ALTERATION AND SOURCE ROCK POTENTIAL OF 8/11-1 NORWEGIAN NO. SEA

FIGURE 2



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