

ROBERTSON RESEARCH INTERNATIONAL LIMITED

D-11

NORWEGIAN OFFSHORE AREA - PRELIMINARY REPORT NO. 3B

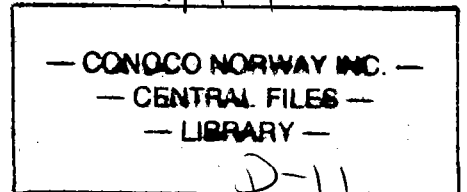
Project No. RRI/789/IIB/2676

PRELIMINARY RESULTS OF PETROLEUM GEOCHEMICAL STUDIES

OF THE AMOSEAS 9/4-1 WELL

30th JUNE, 1978

I



INTRODUCTION

Petroleum geochemical studies have been carried out on samples received from the Amoseas 9/4-1 well. Samples were received at 10 feet intervals from 4510 to 9690 feet and were composited at 60 feet intervals dependant on lithological and log data. The composite samples were washed with cold water as necessary to remove drilling mud and air dried at 50°C. The 13 $\frac{3}{8}$ " casing was set at about 3629 feet in the Tertiary with no further casing points to T.D. Significant amounts of caved Tertiary age rocks have been observed in the Cretaceous and Jurassic and very severe caving of Upper Jurassic is suspected in the pre-Jurassic interval. No diesel contamination is suspected in the analysed interval of the well. In view of the degree of caving the samples are of variable quality for geochemical studies. Additional samples from the upper part of the well have now been obtained and it is intended to carry out analyses in the Lower Tertiary particularly to determine maturation levels.

The analytical procedures used include organic carbon analysis on all the bulk cuttings samples at 60 feet intervals and also on individual lithologies where bulk samples consisted of more than one lithotype. Extractive source rock analysis has been carried out on samples containing more than 0.5% organic carbon at approximately 250 feet intervals. Gas chromatographic analysis has been carried out on alkane fractions from samples containing greater than 100 ppm of hydrocarbon. Pyrolysis source rock evaluation using the IFP/Fina ROCK-EVAL apparatus has been carried out on the same samples as used for extractive analysis, on samples where insufficient material was available for extractive analysis and on samples of picked lithologies where composite samples contained more than one significant lithotype. Kerogen composition has been assessed on a semiquantitative basis, by visual estimation of the kerogen components in unsieved, unoxidised, palynological preparations.

Maturity levels have been assessed in this study using principally spore colouration analysis on sieved unoxidised palynological preparations and vitrinite reflectivity on kerogen concentrates. In assessing maturity level, reference may also be made to the temperatures of maximum pyrolysis rate which give useful indications of maturity level when used in conjunction with the kerogen type.

II

RESULTS AND INTERPRETATION

The results of the various analyses carried out on the 9/4-1 well are presented in Tables 1 to 3 and are represented graphically in Figures 1 to 4. Table 1 lists data on maturity level in the section along with the kerogen composition data for the same samples. The spore colouration and vitrinite

reflectivity trends with depth are shown in Figures 1 and 2 respectively.

Table 2 lists the organic carbon and extractive source rock evaluation data while pyrolysis data are presented in Table 3. Pyrolysis data are represented graphically against depth in Figures 3 and 4. A detailed graphic compilation of all the data will be presented later in the compilation report.

MATURITY DATA

Our assessment of the spore colouration data is that the Jurassic interval of the well is at an early stage of maturity for generation of oil from oil-prone organic matter (see source rock evaluation). The results recorded in the chalk interval from 4510 to 5620 feet are believed to have been obtained on caved Lower Tertiary sediments. The results of 2.5 to 3 in this interval, suggest that the Lower Tertiary in this well is immature for hydrocarbon generation. The Jurassic interval would be anticipated to be capable of heavy (low ^oAPI gravity) oil generation.

Vitrinite reflectivity data have been obtained in the Jurassic interval of the well and values are clearly between 0.5% and 0.55% in the Middle Jurassic. The Kimmeridgian interval was mostly fairly rich in humic material with variable amounts of sapropel, and the humic material was a mixture of inertinite (semi-fusinite) with lesser vitrinite. All data obtained in the pre-Jurassic interval are considered to be on caved material. The Lower Cretaceous results are of poor quality while the data from the chalk are again believed to be on caved material from the Tertiary.

HYDROCARBON SOURCE POTENTIAL DATA

On the basis of the geochemical data obtained, the following breakdown of the analysed interval of the 9/4-1 well is made:

Interval 4510 to 5920 feet - Chalk - organically lean but in the upper part of the interval is contaminated by caved

- Lower Tertiary light grey shales. No source potential.
- Interval 5930 to 6400 feet - Lower Cretaceous marls. Below to average organic carbon content. Solvents extractable hydrocarbon content indicates possible source potential but pyrolysis data indicate this interval has no source potential even at optimum maturity. Kerogen composition appears to be predominantly inertinitic. No source potential.
- Interval 6410 to 7260 feet - Upper Jurassic shale. Average to slightly above average carbon content. Kerogen composition is dominantly humic with lesser sapropel (?) but pyrolysis data indicate no significant hydrogen indices or hydrocarbon yields at optimum maturity. No source potential.
- Interval 7270 to 7400 feet - Upper Jurassic shale. Well above average carbon content at about 6%. Extractable hydrocarbon content is not very high and pyrolysis data and kerogen composition indicate a mixture of vitrinite, inertinite and sapropel. Hydrocarbon yield at optimum maturity is good but the source rock will yield a mixture of gas and oil rather than oil alone. Present source potential is poor with minor gas most likely.
- Interval 7410 to 7660 feet - This interval includes the base of the Upper Jurassic shale unit into the Middle Jurassic (?)

sands. Organic carbon content of the sample from the Upper Jurassic shale is above average at 4% but hydrocarbon generating potential as assessed by pyrolysis appears poor. The Middle Jurassic (?) coal has indicated a vitrinite reflectivity of 0.48% and source potential in the sands of the same age will be nil. However, some extractable migrant (?) hydrocarbon was found in the sample from 7470 to 7530 feet and is being further analysed. A poor oil-show was recorded in the upper part of the sand body below 7507 feet.

Interval 7670 to 9690 feet

- This interval is of pre-Jurassic age - mostly Triassic but penetrating Permian (?) evaporites at 9642 feet. The cuttings samples are dominated by dark grey shales of Upper Jurassic (?) age. In situ lithology is mostly reddened silts and sands in the upper part becoming more argillaceous with depth. The hydrocarbon generating potential of this interval is likely to be nil and none of the analytical data obtained is believed to be reliable.

TABLE 1 MATURITY EVALUATION DATA

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

SAMPLE DEPTH (FEET)	SAMPLE TYPE	GENERALISED LITHOLOGY	SPORE COLOUR INDEX (1 - 10)	VITRINITE REFLECTIVITY IN OIL, R _{av} %	KEROGEN COMPOSITION (%)		
					INERTINITE	VITRINITE	SAPROPEL
4510-570	Ctgs	Chk+mnr lt gy sh	2.5?	*	*	*	*
4770-830	"	Chk+mnr lt gy sh	3?	0.42(35)	*	*	*
5560-620	"	Chk+mnr lt gy sh	3?	*	*	*	*
5850-910	"	Chk	*	*	*	*	*
5940-970	"	Chk+mnr med gy marl	*	0.41 (2)?	90	10	*
6070-130	"	Med gy marl	4?	0.49 (6);	*	*	*
6410-460	"	Ditto	3.5	0.51 (7)	50	50	*
6740-800	"	Med-dk gy calc sh	3.5	0.55 (4)	30	30	40
7010-060	"	Ditto	4	0.50 (9)	30	30	40
7210-260	"	Ditto	4	0.56(10)	30	10	60
7410-460	"	Ditto	4.5	0.52 (7)	30	10	60
7540-600	"	Snd/sst+40% dk gy sh	4.5	0.48(47)	30	10	60
7870-900	"	Ditto+10% ditto	4?	0.53(15)?	30	30	40
8120-160	"	Vgt sh/sst+20% ditto	4?	0.54(12)?	*	*	*
8260	"	Med-dk gy calc sh (caved?)	*	*	*	*	*
8460-470	"	Vgt sh/sst+dk gy sh	*	*	*	*	*
8700-710	"	Gy-red calc sh+ mnr gy sh	*	*	*	*	*
9070-130	"	Ditto + mnr ditto	*	*	*	*	*
9610-650	"	Ditto + mnr ditto	*	*	*	*	*

SOURCE ROCK EVALUATION DATA

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

SAMPLE DEPTH (FEET) OR NOTATION	SAMPLE TYPE	ANALYSED LITHOLOGY	ORGANIC CARBON % OF ROCK	TOTAL EXTRACT P.P.M.	EXTRACT % OF ORGANIC CARBON	HYDRO- -CARBONS P.P.M. OF ROCK	HYDRO- CARBONS % OF EXTRACT	TOTAL ALKANES % HYDRO- CARBONS
4510-570	Ctgs	Wht chk + 10% lt gy/ lt ol-gy slty calc sh	0.41					
4580-630	"	Ditto + 40% ditto	0.42					
4640-700	"	Ditto + 10% ditto	0.20					
4710-760	"	Ditto + 10% ditto	0.14					
4770-830	"	Ditto + mnr ditto	0.16					
5560-620	"	Ditto + ditto	0.22					
5630-690	"	V lt gy chk	0.17					
5700-760	"	Ditto	0.11					
5780-840	"	Ditto	0.13					
5850-910	"	Ditto	0.15					
5920	"	Wht/yel-brn chk	0.24					
5930	"	Ditto + mnr med gy marl	0.74					
5940-970	"	Ditto + ditto	0.82					
5980-6040	"	Med gy marl + gy-red/ yel-brn marl	0.48					
6050-060	"	Ditto	0.40					
6070-130	"	Ditto + mnr crs snd	0.84	745	8.8	90	12	66
6140-200	"	Ditto + ditto	1.11					
6210-260	"	Ditto + ditto	1.16					
6270-330	"	Ditto + ditto	1.28					
6340-400	"	Med gy marl + gy-red marl + mnr snd	1.61	470	2.9	100	20	79
6410-460	"	Ditto + ditto	3.18					
6470-530	"	Ditto + ditto	1.44					
6540-600	"	Ditto + ditto	2.01	615	3.0	145	23	69
6610-660	"	Med-dk gy calc sh + 40% lt gy calc sh + mnr dk gy sh + mnr chk	2.18					
6670-730	"	Lt gy/med-dk gy calc sh + mnr dk gy sh	1.96					
6740-800	"	Med-dk gy sl slty calc sh + 20% lt ol- gy sltst	1.95					
6810-860	"	Med-dk gy sl slty calc sh + mnr chk	1.60					

SOURCE ROCK EVALUATION DATA

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

SAMPLE DEPTH (FEET) OR NOTATION	SAMPLE TYPE	ANALYSED LITHOLOGY	ORGANIC CARBON % OF ROCK	TOTAL EXTRACT P.P.M.	EXTRACT % OF ORGANIC CARBON	HYDRO- CARBONS P.P.M. OF ROCK	HYDRO- CARBONS % OF EXTRACT	TOTAL ALKANES % HYDRO- CARBONS
6870-930	Ctgs	Med-dk gy sl slty calc sh + mnr chk	1.58	725	4.5	275	38	63
6940-7000	"	Ditto + ditto	1.12					
7010-060	"	Ditto + ditto	1.39					
7070-130	"	Ditto + ditto	1.70	635	3.7	85	13	65
7140-200	"	Ditto + ditto	1.95					
7210-260	"	Ditto + ditto	2.78					
7270-330	"	Ditto + ditto	6.98	3550	5.0	260	7	61
7340-400	"	Ditto + ditto	6.04					
7410-460	"	Ditto + ditto	4.16					
7470-530	"	Med-dk gy calc, slty sh + 10% dk yel-brn sst + mnr chk	4.47	2400	5.3	305	13	71
7540-600	"	Vgt snd/sst + 40% dk gy calc sh + mnr coal	16.06					
7610-660	"	Ditto + ditto + ditto	5.16	2890	5.6	330	11	44
7670-730	"	Wht/ol-gy sst + 20% vgt sst + 30% dk gy sh + mnr coal	4.29					
7740-800	"	Ditto + ditto + ditto	2.04	1060	5.1	165	15	53
7810-860	"	Vgt gy red/wht sst + 20% dk gy calc sh	1.58					
7870-900	"	Ditto + 10% ditto	1.93					
7910-960	"	Ditto + 30% ditto	3.01					
7970-8030	"	Ditto + ditto	1.75	1010	5.7	180	18	61
8040-100	"	Pnk-gy/gy-red calc sh + 40% vgt sst + mnr dk gy calc sh	1.50					
8110	"	Gy-red v calc marl + + vgt sh/sst	1.50					
8120-160	"	Vgt sh/sst + 20% dk gy calc sh	1.13					
8170	"	Gy-red sh /sst + 30% dk gy calc sh	1.52					
8180-190	"	Gy-red/yel-gy/lt ol- gy sh + 40% vgt sst + 10% dk gy sh	2.08					
8200	"	Dk gy calc sh + 20% gy-red sh + mnr wht/ gn sst	3.10					

SOURCE ROCK EVALUATION DATA

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

SAMPLE DEPTH (FEED OR NOTATION	SAMPLE TYPE	ANALYSED LITHOLOGY	ORGANIC CARBON % OF ROCK	TOTAL EXTRACT P.P.M.	EXTRACT % OF ORGANIC CARBON	HYDRO- CARBONS P.P.M. OF ROCK	HYDRO- CARBONS % OF EXTRACT	TOTAL ALKANES % HYDRO- CARBONS
8210-230	Ctgs	Vgt sst + 30% gy-red calc sh + 20% dk gy calc sh	1.33					
8240	"	Dk gy calc sh + 40% gy red calc sh + 10% vgt sst	2.46					
8250	"	Lt/med gy calc sh + vgt sst + mnr dk gy calc sh	2.06					
8260	"	Med-dk gy calc sh	2.07					
8270-330	"	V calc vgt sst/sh + 10% dk gy sl calc sh	1.88					
8340-400	"	Ditto + ditto	1.13					
8410-450	"	Ditto + ditto	0.94	595	6.2	140	24	65
8460-470	"	Ditto + ditto	1.40					
8480-540	"	Gy-red calc sh + 10% vgt sst + 15% dk gy sl calc sh	1.93					
8550-610	"	Ditto + ditto + ditto	1.17					
8620-680	"	Ditto + ditto + ditto	1.07	1675	15.6	435	26	81
8690	"	Ditto + ditto + ditto	2.45					
8700-710	"	Ditto + ditto + ditto	1.47					
8720-780	"	Ditto + ditto + ditto	1.10					
8790-850	"	Wht/pnk-gy/gy-red sh/ sst + 10% dk gy calc sh	1.07					
8860-920	"	Ditto + ditto	1.00					
8930-990	"	Ditto + ditto	1.18					
9000-060	"	Ditto + ditto	1.42	1135	7.9	290	25	78
9070-130	"	Ditto + ditto	2.44					
9140-190	"	Ditto + ditto	1.40					
9200-260	"	Ditto + ditto	1.18	835	7.0	190	22	77
2970-330	"	Ditto + ditto	0.80					
9340-400	"	Ditto + ditto	0.41					
9410-460	"	Ditto + ditto	0.76					
9470-530	"	Ditto + ditto	0.90					
9540-600	"	Ditto + ditto	0.84	775	9.2	185	24	81
9610-650	"	Ditto + ditto	1.41					
9660-690	"	Ditto + ditto	1.77					

SOURCE ROCK EVALUATION DATA

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

SAMPLE DEPTH (FEET) OR NOTATION	SAMPLE TYPE	ANALYSED LITHOLOGY	ORGANIC CARBON % OF ROCK	TOTAL EXTRACT P.P.M.	EXTRACT % OF ORGANIC CARBON	HYDRO- -CARBONS P.P.M. OF ROCK	HYDRO- CARBONS % OF EXTRACT	TOTAL ALKANES %HYDRO- CARBONS
<u>PICKED LITHOLOGIES</u>								
4510-510	Ctgs	Chk	0.16					
4580-630	"	Ditto	0.12					
4640-700	"	Ditto	0.13					
4710-760	"	Ditto	0.15					
4770-830	"	Ditto	0.12					
5560-620	"	Ditto	0.17					
5630-690	"	Ditto	0.17					
5700-760	"	Ditto	0.12					
5780-840	"	Ditto	0.13					
5850-910	"	Ditto	0.12					
7540-600	"	Coal	32.98					
7540-600	"	Dk gy sh	7.22					
7870-900	"	Ditto	5.54					
7870-900	"	Lt gy sst	0.32					
8120-160	"	Dk gy sh	4.05					
8120-160	"	Gy-red slty sh	0.31					
8210-230	"	Dk gy sh	3.91					
8210-230	"	Gy-red slty sh	0.15					
8270-330	"	Dk gy sh	4.21					
8270-330	"	Gy-red slty sh	0.16					
8480-540	"	Dk gy sh	3.48					
8480-540	"	Gy-red slty sh	0.59					
8720-780	"	Dk gy sh	3.86					
8720-780	"	Gy-red slty sh	0.15					
8930-990	"	Dk gy sh	4.27					
8930-990	"	Gy-red slty sh	0.23					
9070-130	"	Dk gy sh	4.03					
9070-130	"	Gy-red slty sh	0.20					
9470-530	"	Dk gy sh	3.83					
9470-530	"	Gy-red slty sh	0.22					
9610-650	"	Dk gy sh	2.90					
9610-650	"	Gy-red slty sh	0.16					

TABLE 3A

ROCK - EVAL. PYROLYSIS DATA

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

SAMPLE DEPTH (FEET) OR NOTATION	GENERALISED LITHOLOGY	ORGANIC CARBON (%)	TEMPERATURE (°C)	HYDROGEN INDEX	OXYGEN INDEX	PRODUCTION INDEX	POTENTIAL YIELD (PPM)
4710- 760	Chk+mnr lt gy sh	0.14	*	*	596	*	*
5630- 690	Ditto	0.17	408	7	612	*	*
5850- 910	Ditto	0.15	433	(1999)?	815	*	3000
6070- 130	Med gy sh+30% mtl gy sh	0.62	*	*	361	*	*
6340- 400	Ditto+ditto	1.09	421	6	170	*	100
6540- 600	Ditto+ditto	2.02	426	92	97	*	1900
6740- 800	Med-dk gy sh+mnr lt gy sltst	1.95	427	72	72	*	2000
6870- 930	Ditto+mnr chk+ mnr snd	1.21	*	*	58	*	*
7070- 130	Ditto+ditto+ ditto	1.70	*	*	59	*	*
7270- 330	Ditto+ditto+ ditto	6.97	431	276	37	*	19200
7340- 400	Ditto+ditto+ ditto	6.04	404	249	47	*	15000
7410- 460	Ditto+ditto+ ditto	4.16	418	153	74	*	6000
7470- 530	Ditto+ 10% dk brn sst+mnr chk	4.88	412	187	32	*	8400
7540- 600	Snd/sst+30% dk gy calc sh+coal	16.06	413	149	24	*	23000
7610- 660	Ditto+30% ditto	4.73	424	177	31	*	9200
7670- 730	Ditto+30% ditto	4.29	420	82	35	*	3500
7740- 800	Ditto+30% ditto	2.07	421	113	124	*	2300
7910- 960	Mtl sh/sst+30% dk gy sh	3.01	425	3	48	*	1000
7970-8030	Ditto+30% ditto	1.40	424	134	69	*	2000
8170	Gy-red sh/sst+ mnr dk gy sh	1.52	418	161	85	*	2400
8200	Ditto+80% dk gy sh	3.10	417	205	21	*	6300

TEMPERATURE (°C) = TEMPERATURE AT MAXIMUM RATE OF PYROLYSIS
 PRODUCTION INDEX = AN ESTIMATE OF PRESENT HYDROCARBON GENERATING POTENTIAL
 COMPARED TO THAT AT OPTIMUM MATURITY
 POTENTIAL YIELD = AN ESTIMATE OF HYDROCARBON PRODUCTION AT OPTIMUM MATURITY

TABLE 3B

ROCK - EVAL. PYROLYSIS DATA

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

SAMPLE DEPTH (FEET) OR NOTATION	GENERALISED LITHOLOGY	ORGANIC CARBON (%)	TEMPERATURE (°C)	HYDROGEN INDEX	OXYGEN INDEX	PRODUCTION INDEX	POTENTIAL YIELD (PPM)
8260	Med-dk gy sh+mnr sst	2.07	425	58	97	*	1200
8410- 450	Gy-red sh/sst+ 10% dk gy sh	0.95	425	112	105	*	1100
8620- 680	Ditto+15% ditto	0.82	426	972	296	*	11000
8700- 760	Ditto+15% ditto	1.47	422	198	119	*	2900
9000- 060	Ditto+10% ditto	1.12	429	73	188	*	1000
9070- 130	Ditto+10% ditto	2.44	413	48	69	*	1200
9200- 260	Ditto+10% ditto	1.18	425	66	99	*	800
9540- 600	Ditto+10% ditto	0.71	426	23	230	*	200
PICKED LITHOLOGIES							
4510- 570	Wht chk	0.16	*	*	255	*	*
4770- 830	Ditto	0.12	*	*	396	*	*
5560- 620	Ditto	0.17	419	98	357	0.2	200
5850- 910	Ditto	0.12	*	*	562	*	*
7540- 600	Coal	32.98	417	349	35	0.01	120000
7540- 600	Med-dk gy sh	7.22	421	241	21	0.01	17000
7870- 900	Ditto	5.54	427	275	50	*	15000
8120- 160	Ditto	4.05	427	281	37	*	12000
8210- 230	Ditto	3.91	421	135	69	*	5300
8270- 330	Dk gy sh	4.21	428	82	18	*	3500
8480- 540	Ditto	3.48	431	161	38	*	5600
8720- 780	Ditto	3.86	426	209	26	*	8100
8930- 990	Ditto	4.27	428	232	35	*	9900
9070- 130	Ditto	4.03	430	199	40	*	8000
9470- 530	Ditto	3.83	430	325	27	*	12000
9610- 650	Ditto	2.90	428	290	38	*	8400
9660- 690	Ditto	3.06	420	36	125	*	1100

TEMPERATURE (°C) = TEMPERATURE AT MAXIMUM RATE OF PYROLYSIS
 PRODUCTION INDEX = AN ESTIMATE OF PRESENT HYDROCARBON GENERATING POTENTIAL
 COMPARED TO THAT AT OPTIMUM MATURITY
 POTENTIAL YIELD = AN ESTIMATE OF HYDROCARBON PRODUCTION AT OPTIMUM MATURITY

FIGURE 1 SPORE COLOURATION INDICES AGAINST DEPTH

WELL: 9/4-1

LOCATION: NORWEGIAN NORTH SEA

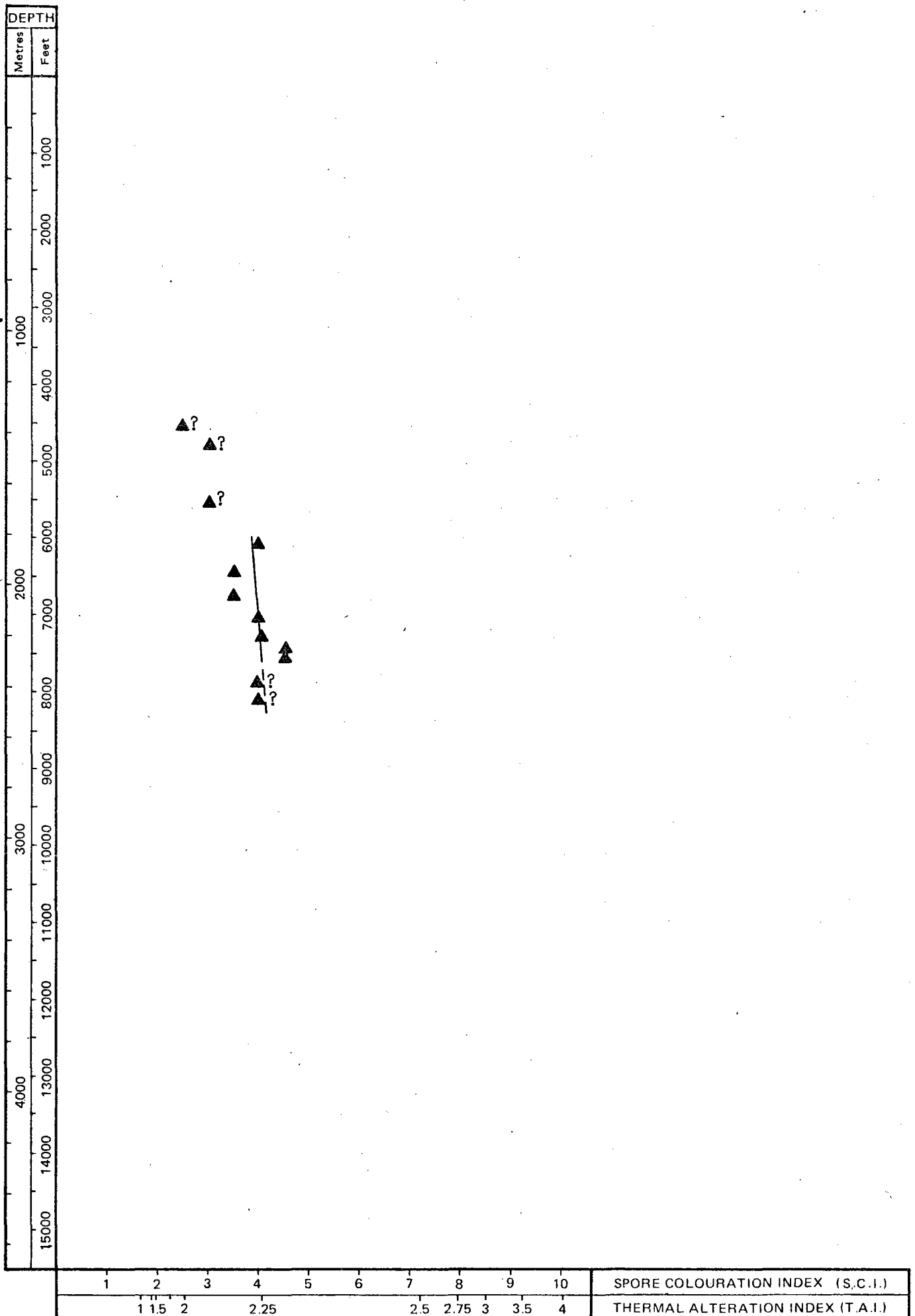
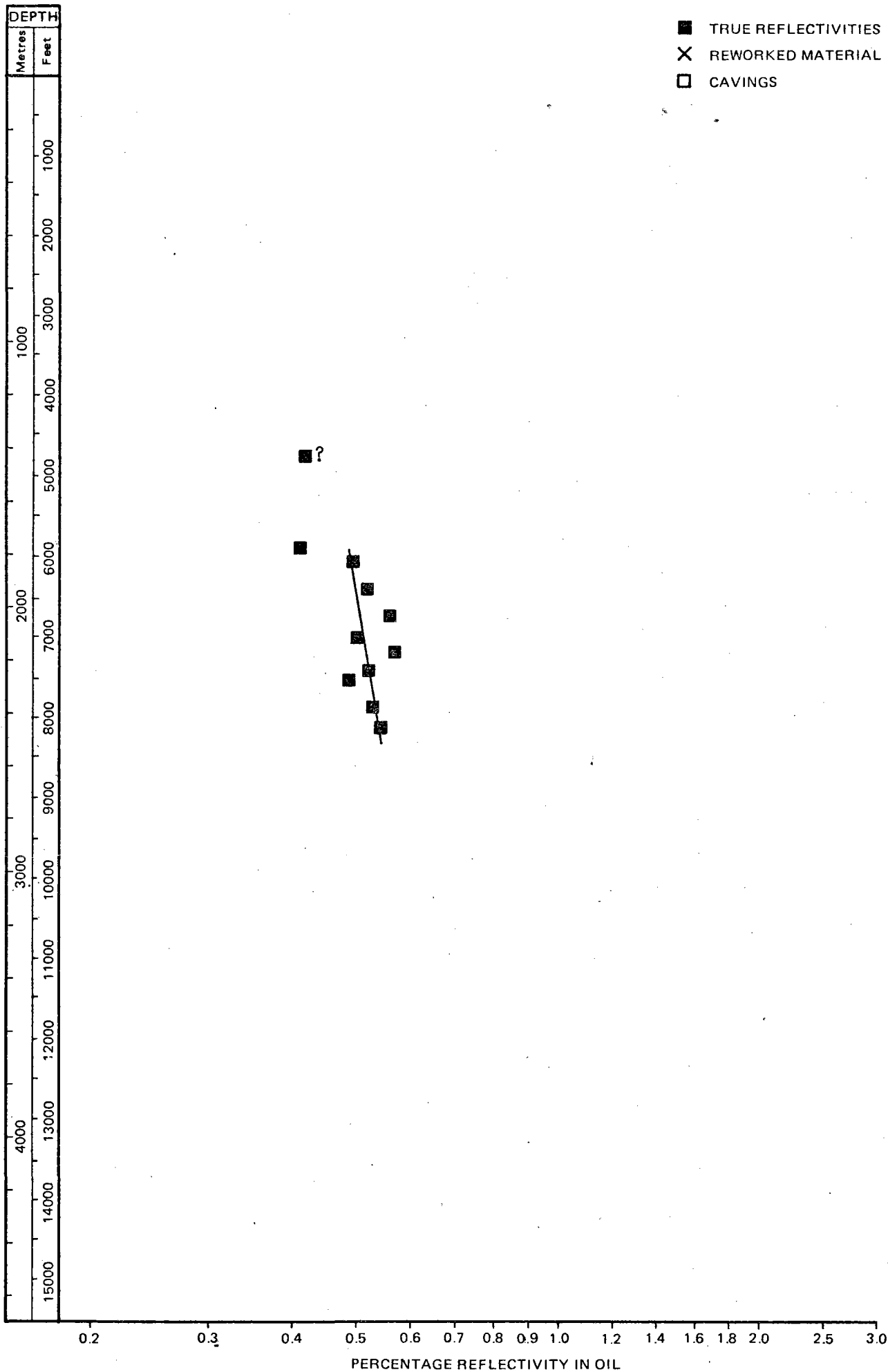


FIGURE 2 VITRINITE REFLECTIVITY AGAINST DEPTH

WELL : 9/4 - I

LOCATION : NORWEGIAN NORTH SEA



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PETROLEUM GEOCHEMISTRY

Sample Coverage

Good. Fair to good quality ditch cuttings over the interval 6400' to 7640'.

Maturity

Vitrinite reflectivity: immature values of 0.25% to 0.3% over section, indicating that gas-prone organic matter can source only limited quantities of gas at present.

Maximum palaeotemperature: 250° to 270°F over analysed section, indicating that oil-prone source rocks can yield medium gravity oil.

Spore colouration: 6 to 6.5 over section, implying that oil-prone organic matter is mature. The data correlates very well with maximum palaeotemperature.

Palaeothermal gradient: approximately 1.7°F per 100' over section.

Source Potential

6400' - 7130': average organic carbon content. Some immature gas sources and some good medium gravity oil sources, particularly between 6520' and 7050'.

7270' - 7640': organically rich (3% to 8%) but mainly gas-prone; good potential gas sources with increased thermal maturity at 7270' - 7350' and 7600' - 7640' (some coal).

SOURCE ROCK - MAX. PALAEO TEMPERATURE DATA

Client -
 Well / Notation - 9/4-1
 Location - NORW. N. SEA
 Project No.

Submitted:
 Results:

AGE : T : M/P
 Return to:

SAMPLE NO.	SAMPLE DEPTH (FEET / METERS) NOTATION	SOURCE ROCK						MAX. PALAEO TEMPERATURE							
		ORGANIC CARBON %	EXTRACT R.P.M.	EPOC	H.C. P.P.M.	H.C% EXTRACT	ALKANES % EXTR.	K.C. %	RSD	W	Ng	'g'	TNg	T'g'	MPT
1	6400-40	1.75	2280	13.0	500	22	>90	18.3	2.5	5.2	1.76	32.4	192	272	245
2	6520-50	1.69	1240	7.3	530	42	>90	-	-	-	-	-	-	-	-
3	6600-40	1.81	1390	7.7	660	47	>90	23.2	4.2	5.2	2.92	32.4	209	272	251
4	6710-50	1.68	2080	12.4	620	30	>90	-	-	-	-	-	-	-	-
5	6800-40	1.41	1100	7.8	610	56	85	21.8	5.4	4.9	4.33	31.9	230	283	265
6	6900-30	1.08	1040	9.6	430	41	>90	-	-	-	-	-	-	-	-
7	7010-50	1.13	860	7.6	350	41	>90	19.9	5.7	5.1	5.17	31.7	236	287	270
8	7100-30	1.38	1360	9.9	320	24	>90	-	-	-	-	-	-	-	-
9	7270-90	6.60	5290	8.0	910	17	>90	41.0	3.5	4.7	2.45	31.9	203	283	256
10	7320-50	5.90	4430	7.5	800	18	76	-	-	-	-	-	-	-	-
11	7400-30	3.88	2750	7.1	640	23	72	36.8	4.8	4.6	3.31	31.8	214	285	261
12	7470-90	3.56	2600	7.3	620	24	85	-	-	-	-	-	-	-	-
13	7600-40	3.59	3630	10.1	320	9	82	37.7	4.9	5.3	2.86	32.8	209	264	246
TOTAL O.C.		13	13	TOTAL S.R.							TOTAL M.P.T.			7	
S.R.P. Nos.				M.P.T. Nos.				TABLE 2							

Hot shale }
 out-100 }

TABLE 1

MATURATION EVALUATION DATA

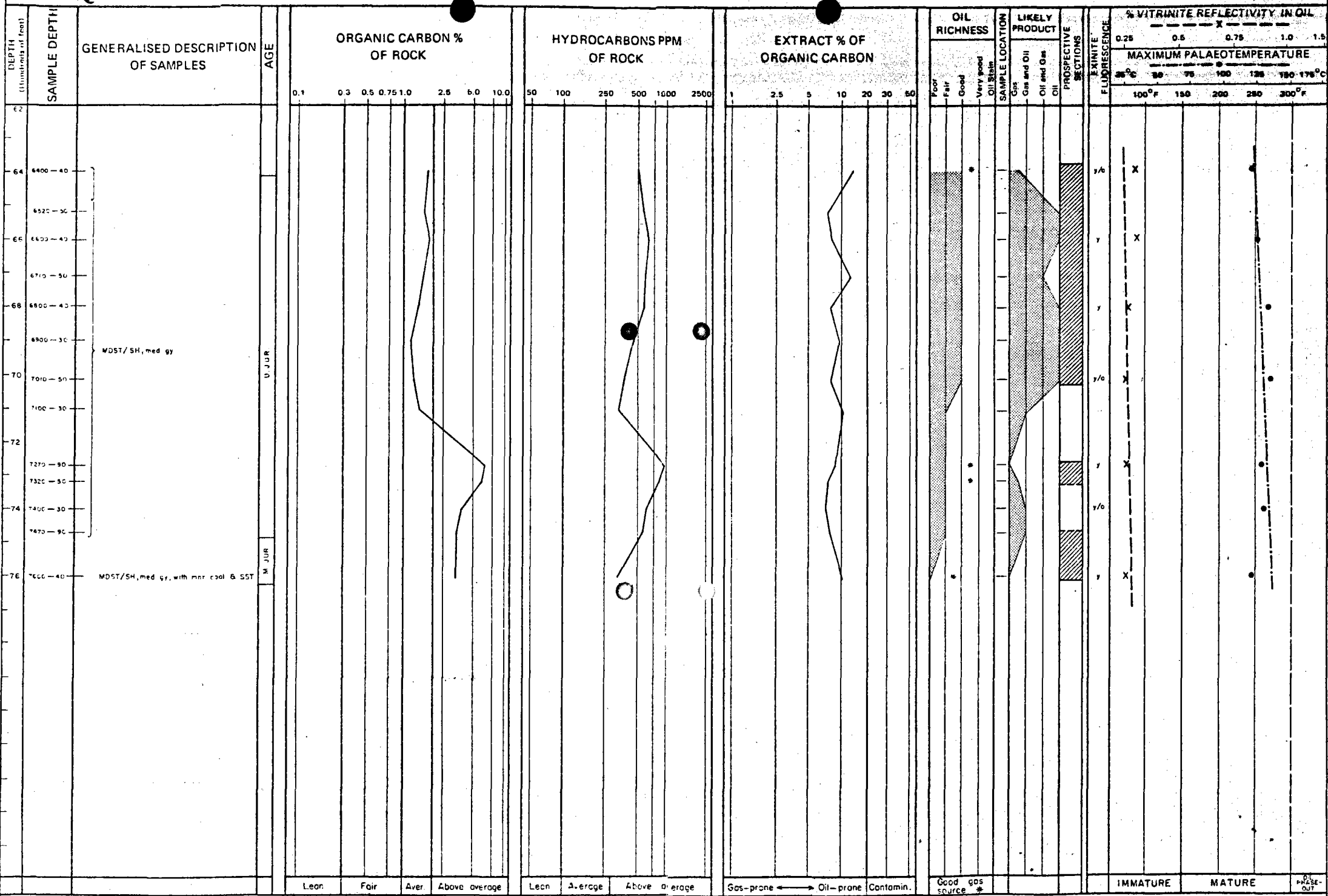
COMPANY:

WELL: 9/4-1

LOCATION: NORW. N. SEA

SAMPLE DEPTH (OR NOTATION	SAMPLE TYPE	GENERALISED LITHOLOGY	MAXIMUM PALAEOTEMP- -ERATURE °F	VITRINITE REFLECTIVITY %	SPORE COLOURATION (1-10)	LIGHT HYDROCARBONS
1	Ctgs	MDST/SH, gy	245	0.28	6	
2	"	"	-	-	-	
3	"	"	251	0.29	6-6.5	
4	"	"	-	-	-	
5	"	"	265	0.24	6-6.5	
6	"	"	-	-	-	
7	"	"	270	0.25	6-6.5	
8	"	"	-	-	-	
9	"	"	256	0.24	6-6.5	
10	"	"	-	-	-	
11	"	"	261	(0.16)	6-6.5	
12	"	"	-	-	-	
13	"	with mar COAL & SST	246	0.24 O.K.	6.5	

Definitely Wrong



TYPE OF SAMPLE

VITRINITE FLUORESCENCE

OPERATOR:- AMOSEAS