SOURCE ROCK POTENTIAL OF THE JURASSIC SOURCE ROCK FROM THE 2/7-1X AND 2/7-B12 WELLS, ELDFISK FIELD, GENERAL LICENSE AREA, NORWEGIAN SECTOR, NORTH SEA

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Source Rock Potential of the Jurassic Source Rock from the 2/7-1X and 2/7-B12 Wells, Eldfisk Field, General License Area, Norwegian Sector, North Sea

EPS Report No. 2666A

Summary and Conclusions

The Jurassic source rocks encountered in the 2/7-1X and 2/7-B12 wells have excellent potential to generate oil and gas, but differ in their thermal maturity. In both wells, the quality of the source rocks decreases with depth from the oil-prone Mandel Fm., at the top of the Jurassic, to the gas-prone Haugesund Fm., at T.D. Estimates of the original (pre-catagenetic) potential of the oil-prone source rocks indicate that both wells contained some intervals capable of generating extractable organic matter (EOM) in excess of 300 barrels per acre-foot (BAF). (Please see Appendix A before using the BAF data.)

Discussion

A five-level descriptive scale is used to rank the source rock potential of rocks in this study. The scale, in decreasing order of quality, is: Excellent; Very Good; Good; Fair; Poor.

2/7-1X Well

12,160-12,260 ft.: Upper Mandal Fm.
Present Potential: Excellent oil
Original Potential: Excellent oil

Except for a 20' interval (13,820-13,840') at the base of the Lower Mandal Fm. with unusually high TOC, the Upper Mandal Fm. has the best overall source rock potential of any portion of the

Jurassic section. The interval has reached the upper stage of the main oil generation phase (Ro = .91%) and should be actively generating and expelling oil and some gas. It has abundant (75-85%) liquid-prone kerogen that exhibits an intense orange fluorescence, which indicates that the kerogen still maintains excellent oil generating potential. The high H.I. (322-460 mg/g) of the kerogen supports the oil-prone assessment by the visual methods. The high TOC values for the whole rock indicate that this interval should be capable of generating large quantities of oil.

At the onset of catagenesis, the rocks had an excellent oil generating potential based on rich TOC (3.0-5.5) and abundant, hydrogen-rich (HI = 465-640) oil-prone kerogen with an estimated EOM generation yield of 78-209 BAF at peak oil generating maturity.

12,410-13,840 ft.: Lower Mandal Fm. and Farsund Fm.
Present Potential: Good oil; excellent wet gas and gas
Original Potential: Very good to excellent oil and gas

This interval has a good potential to generate and expell oil, wet gas and gas. The sediments have reached the upper stage of the main oil window (Ro = 0.95-1.01) and they should be actively generating and expelling hydrocarbons. Oils expelled at this maturity level may be expected to be lighter than oils generated in the early oil window.

Under blue light, the kerogens isolated from the samples in this interval exhibit intense orange and brown fluorescence, indicating that these fractions retain significant oil generating potential. The kerogens in this interval generally contain only 50-70% of this oil-prone fraction which suggests that, in addition to oil, significant amounts of gas will be generated. This gas/oil assessment is supported by the moderate HI values obtained

for the kerogens (194-263) and the whole rock (159-208).

At the onset of catagenesis the rocks had very good to excellent potential to generate oil and gas. They contained abundant organic carbon (TOC = 2.1-20.8%) and hydrogen-rich (HI = 300-425), oil-prone kerogen (50-70%) with estimated EOM yields of 43-332 BAF (Table VII).

13,870-14,730 ft.: Haugesund Fm.
Present Potential: Excellent gas and wet gas
Original Potential: Fair to good oil; excellent gas

This interval has reached advanced oil phase maturity and it should actively be generating and expelling large quantities of gas and wet gas. It is characterized by a rich organic carbon content (TOC: 4.5-9.4%) and a predominance of amorphous kerogen macerals (62-90 rel. %). The macerals have little to no fluorescence. The low fluorescence, high maturity (Ro: 1.0-1.1%) and low HI (131-183) of the kerogen indicate that these samples may have already generated and expelled oil and gas and presently retain only gas and wet gas potential. The original hydrocarbon generating potential for this interval was fair to good for oil and excellent for gas. These rocks are estimated to have had kerogens with HI values ranging from 205 to 281 with EOM yields from 58 to 122 BAF. The large EOM yields are more the result of the great quantity of the organic matter (TOC) than its quality (HI, fluorescence intensity). Large quantities of both oil and gas probably have been generated and expelled.

2/7-B12 Well

11,400-12,000 ft.: Mandal Fm. and Farsund Fm.
Present potential: Good to excellent oil
Original potential: Very good to excellent oil

This interval contains the best source rock encountered in the Jurassic section of this well. Its oil-prone nature is shown by the predominance of hydrogen-rich (HI = 242-466) and liquid-prone (70-95 rel. %) kerogens which exhibit intense yellow-orange fluorescence. The rich organic carbon content (TOC = 5.4-11.2%) coupled with the visual and pyrolysis evidence indicate that these rocks are presently capable of generating and expelling large quantities of oil. At the onset of catagenesis (Ro = .5%), the rocks had very good to excellent generating potential based on whole rock TOC (5.4-11.2%) and abundant, hydrogen-rich (HI = 275-520) liquid-prone kerogen with an estimated EOM yield of 67 to 330 BAF (Table VIII).

12,650-13,150 ft.: Upper Haugesund Fm.
Present potential: Fair oil; excellent gas
Original potential: Good oil; excellent gas

At present, this interval should be generating and expelling sizable quantities of gas, but only moderate amounts of oil. It is organically rich (TOC = 2.8-7.1%), but contains predominantly gas-prone kerogens (40-65 rel. %) with medium intensity yellow-orange fluorescence and only moderate HI values (whole rock = 131 to 177; kerogens = 188-243). Originally, the rocks in this interval possessed rich organic carbon content with moderately hydrogen-rich kerogens (HI: 242-290) and estimated EOM yields of 30 to 106 BAF. The dominance of terrestrially-derived, gas-prone kerogens throughout most of this interval suggests that the ultimate expellable product was probably gas with moderate amounts of oil.

13,250-14,500 ft. TD: Lower Haugesund Fm.
Present potential: Excellent gas; poor oil
Original potential: Excellent gas; poor oil

This interval has reached the upper portion of the peak oil

generating phase and should be actively generating and expelling large quantities of gas. It is characterized by high TOC values (2.1-5.0%), but hydrogen-poor (HI: 35-179), gas-prone (50-80 rel. %) kerogens which exhibit primarily dull brown or no fluorescence. However, two samples at the bottom of the well (14,200'-14,300' and 14,400'-14,500') show intense yellow-orange fluorescence and high TEI (63 and 23). These samples contain more extractable organic matter and may have experienced less oxidation than the other samples in this interval. The original potential of these rocks to generate oil was quite poor. Their estimated EOM yields range from 9 to 37 BAF, but the predominance of hydrogen-poor, gas-prone kerogens indicates that nearly all of the hydrocarbons generated and expelled would be gaseous.

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Geochemist

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Palynologist

Approved:
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Appendix A

The presentation of numerical estimates of the barrels per acre-foot (BAF) of the amount of EOM that the source rock could generate at peak oil generation maturity is a new addition to our basic source rock analysis reports. These peak BAF values are not precise, because they are based on certain assumptions and estimations that may not be precise; therefore, they should be used with restraint and caution. We feel that their most appropriate use is in comparing one source rock to another, but they can be used to make "ball-park" estimates of the amounts of EOM that could have been generated in a given area if the source rock can be assumed to have reached or exceeded peak oil generation maturity. It must be emphasized that these peak BAF figures represent only estimated potential generation of solvent-extractable organic matter (EOM), and do not take into account expulsion efficiency, migration efficiency or trapping efficiency. All of these factors must be considered when trying to determine if a given body of source rock could have generated sufficient hydrocarbons to fill a given trap (or traps).

The peak BAF figure is a quantitative expression of source rock quality, not kerogen quality, because a high TOC can compensate for lower kerogen quality in the estimation of peak BAF.

If peak BAF and source rock maturity are promising, an evaluation by QEST modeling of petroleum generation is recommended. QEST will estimate the timing of generation and also BAF as a function of maturity. At low to moderate heating rates (burial rates) the peak BAF from QEST using hydrogen index input can be from slightly to rarely over 10% higher. At very rapid heating rates, the QEST peak BAF may be somewhat lower. If QEST is run with visual kerogen type instead of HI, the peak BAF may be from slightly to much higher.

A summary of the procedures used to generate the peak BAF data follows:

1. The procedure is limited to samples which show no evidence of the presence of organic contamination or of migrating or reservoired oil or bitumen.

2. The procedure is not applicable to samples with less than 0.5% TOC and is more reliable when applied to samples with over 1% TOC.

3. The procedure requires the following data:
   a. Kerogen maturity on the vitrinite reflectance (Ro) scale.
   b. The hydrogen index (HI) of isolated kerogen (not the whole-rock hydrogen index normally measured by "Rock Eval").
   c. The total organic carbon content (% TOC).

4. If the maturity level of the kerogen in the sample is 0.5 or less on the Ro scale, the procedure is as follows. If not, go to step 3.

   Step 1 From the hydrogen index of the isolated kerogen, a non-linear relationship based on QEST modeling is used to estimate the barrels of EOM at peak oil generation per acre-foot per percent TOC.

   Step 2 The figure from step 1 is multiplied by %TOC to obtain barrels of EOM per acre foot. If inertinite is greater than about 5%, multiply by (1-weight fraction inertinite).

5. If the maturity level of the kerogen is greater than 0.5 on the Ro scale, the HI and TOC which existed when the sample was immature are estimated from the measured data at the

higher maturity; and then steps 1 and 2 are followed as with an immature sample.

Step 3 The measured hydrogen index and maturity are used with a nomograph based on QEST modeling of petroleum generation to estimate the hydrogen index which existed when the sample was immature.

Step 4 The measured TOC and maturity are used with a nomograph based on QEST modeling of petroleum generation to estimate the TOC with existed when the sample was immature.

Step 5 The results of steps 3 and 4 are used for steps 1 and 2.

6. From visual kerogen type, a maximum value for peak BAF can be estimated. If the visual appearance and fluorescence of the kerogen indicate a lack of oxidation of the kerogen, i.e., excellent organic matter preservation conditions, then the max peak BAF from visual should be close to that estimated from the hydrogen index, steps 1-5 above. Otherwise, the max peak BAF will be larger, possibly much larger.

Step 6 The maximum peak BAF per 1% TOC from visual kerogen type is estimated as follows:

Max peak BAF per 1% initial TOC =
(%oil-prone) x 37.3 + (1-%oil-prone) x 14.1

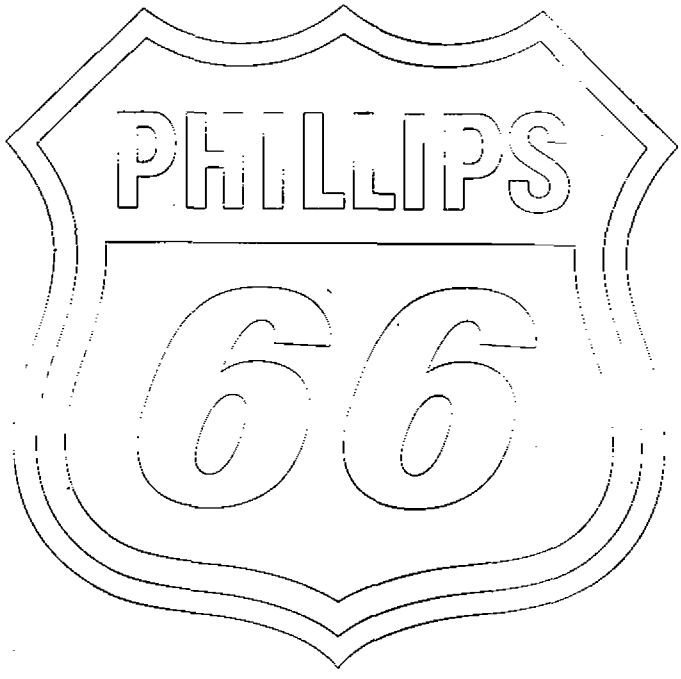
(If inertinite is greater than about 5%, the visual kerogen type is first normalized to an inertinite-free basis.)

Step 7 If the maturity of the sample is greater than

0.5 on the Ro scale, determine initial TOC as in step 4.

Step 8 The max peak BAF from step 6 is multiplied by the initial %TOC from step 7. If inertinite abundance is greater than about 5%, multiply by (1-weight fraction inertinite).

7. The optimism of the max peak BAF from visual kerogen type is warranted only if there is good reason to believe that the major source rock unit was deposited under excellent organic preservation conditions.



SOURCE ROCK REPORT/PLOT TERMINOLOGY

TOC/PYROLYSIS GEOCHEMICAL DATA:

TERM	ABBREV.	DESCRIPTION
TOTAL ORGANIC CARBON	TOC	THE AMOUNT OF ORGANIC CARBON IN A ROCK SAMPLE, EXPRESSED AS WEIGHT PERCENT OF THE ROCK SAMPLE
THERMALLY EXTRACTABLE HYDROCARBONS	S1 (TEH)	THE AMOUNT OF THERMALLY EXTRACTABLE HYDROCARBONS (HC) CURRENTLY IN THE ROCK SAMPLE, EXPRESSED AS MG.HC/G.ROCK
S2	S2	THE AMOUNT OF THERMALLY EXTRACTABLE HYDROCARBONS GENERATED FROM THE THERMAL BREAK DOWN OF THE KEROGEN IN THE SAMPLE (MG.HC/G.ROCK)
PRODUCTION INDEX	PI	S1 / (S1 + S2)
THERMAL EXTRACTION INDEX	TEI	(S1 X 100.0) / TOC
HYDROGEN INDEX	HI	(S2 X 100.0) / TOC

VISUAL KEROGEN DATA:

TERM	ABBREV.	DESCRIPTION
THERMAL ALTERATION INDEX	TAI	SPORE COLOR: 1-2 YELLOW — 3-4 DARK BROWN; 2-3 BROWN — 5 BLACK
ALGINITE	ALG	(ALGAL DEBRIS PLUS CYSTS AND BODIES) PLUS AMORPHOUS SAPROPEL
EXINITE	EXI	POLLEN AND SPORE EXINE, PLANT CUTICLES, RESINS, AND OTHER STRONGLY FLUORSCENT ORGANIC MATTER PLUS AMORPHOUS HERBACEOUS (IF RECOGNIZABLE AS FROM A TERRESTRIAL SOURCE, IF NOT IT IS RECORDED UNDER ALGINITE)
VITRINITE	VIT	WOODY TISSUE (ALTERED TO HUMIC COMPOUNDS) PLUS NONFLUORESCENT STRUCTURED TRANSLUCENT MATERIAL PLUS AMORPHOUS VITRINITE
INERTINITE	INER	COALY MATERIAL INCLUDING FUSINITE, SEMIFUSINITE, PSEUDOVITRINITE, MACRINITE, AND INERTODETRINITE

CORE
CUTTINGS

ELDFISK 2/7-1, NORWEGIAN SECTOR, NORTH SEA (WHOLE ROCK)

SOURCE ROCK GEOCHEMICAL AND VISUAL KEROGEN DATA

FIGURE 1
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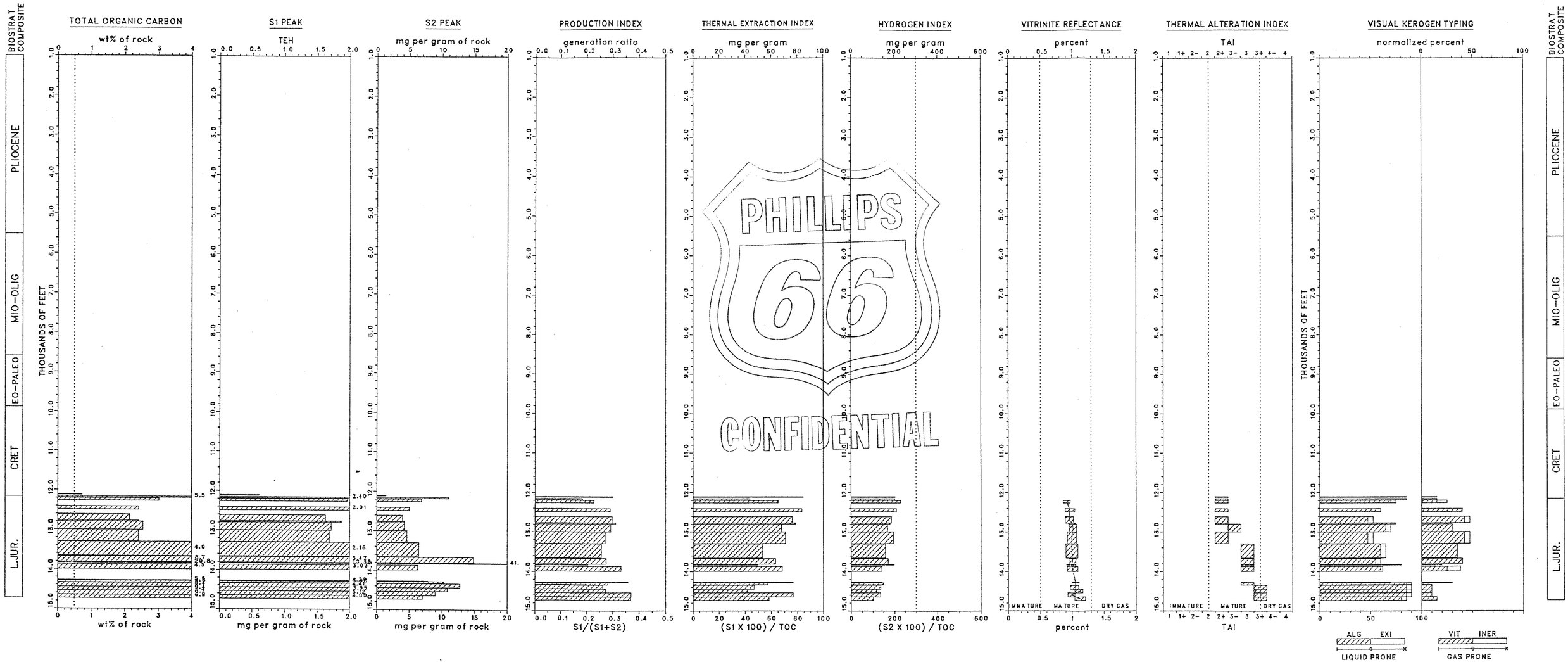

CORE
CUTTINGS

ELDFISK 2/7-1, NORWEGIAN SECTOR, N. SEA (ISOLATED KEROGEN)

PYROLYSIS RESULTS

FIGURE 2
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BIOSTRAT COMPOSITE | PLIOCENE | MIO-OLIG | EO-PALEO | CRET | L.JUR.

TOTAL ORGANIC CARBON — wt% of rock — 0 1 2 3 4

S1 PEAK — TEH — 0.0 0.5 1.0 1.5 2.0

S2 PEAK — mg per gram of rock — 0 5 10 15 20

PRODUCTION INDEX — generation ratio — 0.0 0.1 0.2 0.3 0.4 0.5

THERMAL EXTRACTION INDEX — mg per gram — 0 20 40 60 80 100

HYDROGEN INDEX AND H/C ATOMIC RATIO — mg per gram — 0 200 400 600

THOUSANDS OF FEET — 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

62.2 64.8 62.6 70.3 69.5 73.7 65.8

83.11 71.50 70.79 52.73 59.05 63.70 52.71

157. 179. 136. 165. 150. 115.

134. 110. 139.

wt% of rock — mg per gram of rock — mg per gram of rock — S1/(S1+S2) — (S1 X 100) / TOC — (S2 X 100) / TOC — H/C

CORE
CUTTINGS

2/7-B12 ELDFISK, NORWEGIAN SECTOR, NORTH SEA (WHOLE ROCK)

SOURCE ROCK GEOCHEMICAL AND VISUAL KEROGEN DATA

FIGURE 3
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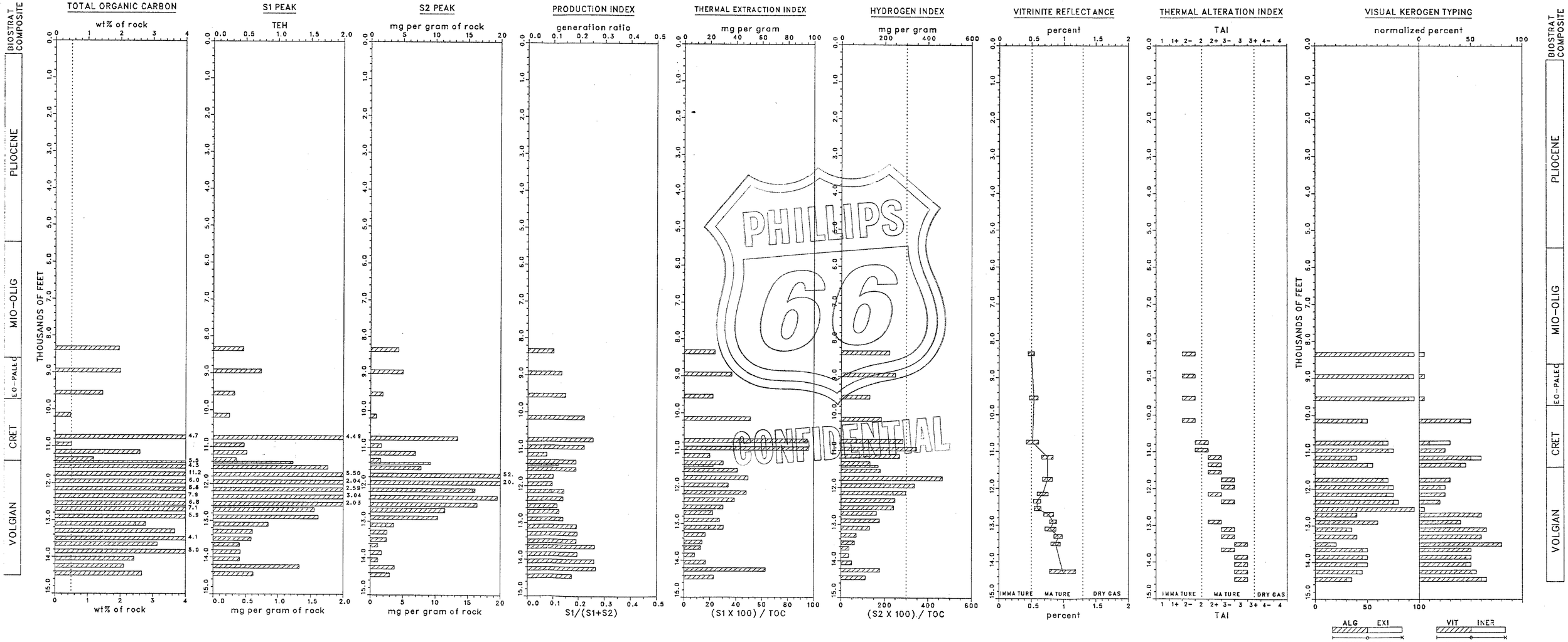

CORE
CUTTINGS

2/7-B12 ELDFISK, NORWEGIAN SECTOR, N. SEA (ISOLATED KEROGEN)

PYROLYSIS RESULTS

FIGURE 4
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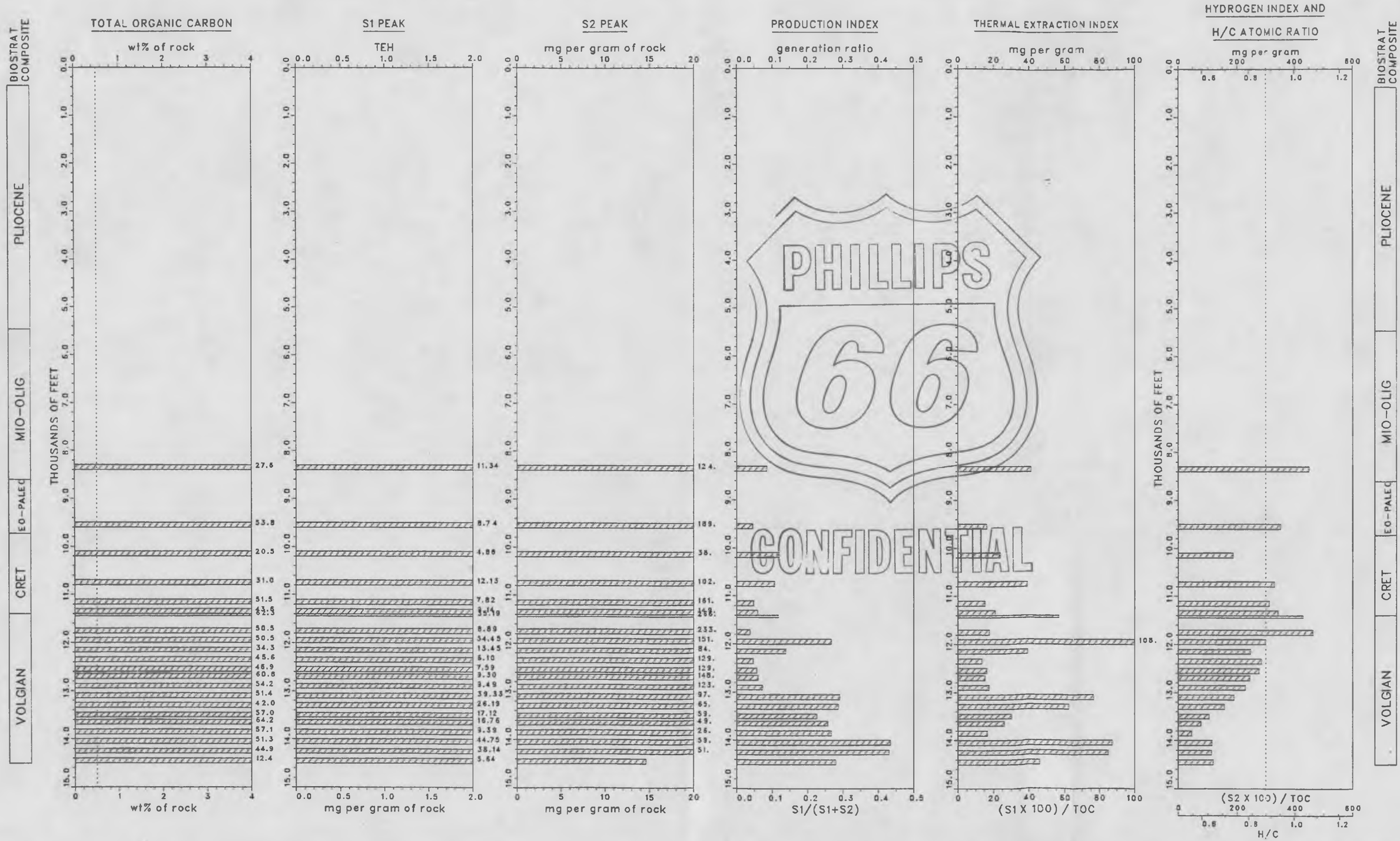

TABLE 1
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SOURCE ROCK GEOCHEMICAL AND VISUAL KEROGEN DATA

ELDFISK 2/7-1, NORWEGIAN SECTOR, NORTH SEA (WHOLE ROCK)

STRAT INTERVAL	SPL TYP	SAMPLE DEPTH FEET	TOTAL ORGANC CARBON TOC	S1 PEAK (TEH)	S2 PEAK	PRODUC TION INDEX PI	THERMAL EXTRAC- TION INDEX TEI	HYDRO GEN INDEX HI	VITRINTE REFLECTANCE (RO) MEAN	STD. DEV.	RO MODE	RO RANGE LOW	RO RANGE HIGH	PTS	THERMAL ALTERA- TION INDEX TAI	VISUAL KEROGEN NORMALIZED PERCENT OIL PRONE ALG	OIL PRONE EXI	GAS PRONE VIT	GAS PRONE INER	GEOCHEM SAMPLE CODE
CRET	CUT	12100-12120	.71	.60	1.43	.30	85	201							2+	80	5	15		EP84BLF
L.JUR.	CUT	12160-12180	5.49	2.40	10.99	.18	44	200							2+	75	10	5	10	EP84BLG
L.JUR.	CUT	12200-12260	3.01	1.96	6.83	.22	65	227	.91	.05	.87	.85	.99	11	2+	70	5	15	10	EP84BLH
L.JUR.	CUT	12410-12490	2.41	2.01	5.02	.29	83	208	.96	.07	.85	.85	1.04	17	2+	55	5	40		EP84BLI
L.JUR.	CUT	12610-12765	2.13	1.62	3.92	.29	76	184	.95	.06	.86	.86	1.03	19	2+	47	5	42	5	EP84BLJ
L.JUR.	CUT	12765-12795	2.39	1.88	4.27	.31	79	179	.99	.05	1.00	.92	1.07	7	2+	70	5	25		EP84BLK
L.JUR.	CUT	12795-13000	2.53	1.71	4.24	.29	68	168	1.01	.05	.97	.91	1.08	23	3-	65	5	30		EP84BLL
L.JUR.	CUT	13000-13290	2.39	1.69	4.65	.27	71	195	.99	.07	.89	.89	1.09	15	2+	47	5	42	5	EP84BLM
L.JUR.	CUT	13300-13650	4.04	2.16	6.41	.25	53	159	.99	.09	.90	.88	1.10	16	3	60	5	35		EP84BLN
L.JUR.	CUT	13670-13810	8.67	5.47	14.77	.27	63	170	1.00	.05	.96	.91	1.09	28	3	55	5	40		EP84BLO
L.JUR.	CUT	13820-13840	20.83	10.30	41.27	.20	49	198	.98	.07	.90	.88	1.10	44	3	75	5	20		EP84BLP
L.JUR.	CUT	13870-13990	4.45	3.03	6.25	.33	68	140	1.00	.08	1.00	.87	1.14	46	3	60	2	25	13	EP84BLQ
L.JUR.	CUT	14275-14290	5.57	4.26	7.79	.35	76	140	1.05	.05	1.08	.96	1.12	14	3	65	5	30		EP84BLR
L.JUR.	CUT	14290-14335	6.84	3.90	10.20	.28	57	149							3	85	5	10		EP84BLS
L.JUR.	CUT	14340-14440	9.39	4.41	12.73	.26	47	136	1.03	.06	.98	.94	1.15	34	3+	85	5	10		EP84BLT
L.JUR.	CUT	14440-14540	9.43	3.95	10.80	.27	42	115	1.10	.06	1.17	.98	1.17	25	3+	85	5	10		EP84BLU
L.JUR.	CUT	14540-14640	6.68	5.12	8.93	.36	77	134	.98	.05	.93	.93	1.07	9	3+	85	5	10		EP84BLV
L.JUR.	CUT	14640-14730	6.87	4.00	6.99	.36	58	102	1.12	.08	1.06	.98	1.25	39	3+	80	5	15		EP84BLW

TABLE II
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PYROLYSIS RESULTS FOR SAMPLES FROM THE ELDFISK 2/7-1, NORWEGIAN SECTOR, N. SEA (ISOLATED KEROGEN)

STRAT. INTERVAL	SPL TYP	SAMPLE DEPTH FEET	TOTAL ORGANIC CARBON WT.%	S1 MG.HC/ G.ROCK	S2 MG.HC/ G.ROCK	PRODUCTION INDEX S1/(S1+S2)	THERMAL EXTRACTION INDEX MG/G.	HYDROGEN INDEX MG/G.	HYDROGEN TO CARBON ATOMIC RATIO	GEOCHEM SAMPLE CODE
L.JUR.	KER	12160-12180	43.32	53.41	199.04	.212	123.29	459.5	1.079	EP84CCI
L.JUR.	KER	12200-12260	61.73	90.92	204.95	.307	147.29	332.0	.918	EP84CCJ
L.JUR.	KER	12410-12490	62.23	83.11	157.36	.346	133.55	252.9	.819	EP84CCK
L.JUR.	KER	12610-12765	64.77	71.50	170.17	.296	110.39	262.7	.831	EP84CCL
L.JUR.	KER	12765-12795	51.42	70.78	127.03	.358	137.65	247.0	.811	EP84CCM
L.JUR.	KER	12795-13000	62.59	52.73	136.23	.279	84.25	217.7	.774	EP84CCN
L.JUR.	KER	13000-13290	70.26	59.06	165.37	.263	84.06	235.4	.797	EP84CCO
L.JUR.	KER	13300-13650	69.48	63.70	149.67	.299	91.68	215.4	.771	EP84CCP
L.JUR.	KER	13670-13810	73.69	67.52	147.59	.314	91.63	200.3	.752	EP84CCQ
L.JUR.	KER	13820-13840	71.07	52.05	138.36	.273	73.24	194.7	.745	EP84CCR
L.JUR.	KER	13870-13990	65.79	60.20	114.58	.344	91.50	174.2	.719	EP84CCS
L.JUR.	KER	14275-14290	64.41	63.24	99.41	.389	98.18	154.3	.694	EP84CCT
L.JUR.	KER	14290-14335	67.47	60.88	123.55	.330	90.23	183.1	.731	EP84CCU
L.JUR.	KER	14340-14440	71.00	48.43	117.60	.292	68.21	165.6	.709	EP84CCV
L.JUR.	KER	14440-14540	70.61	37.02	95.70	.279	52.43	135.5	.671	EP84CCW
L.JUR.	KER	14540-14640	66.07	60.81	90.27	.403	92.04	136.6	.672	EP84CCX
L.JUR.	KER	14640-14730	69.08	52.71	90.15	.369	76.30	130.5	.664	EP84CCY

BIOSTRATIGRAPHY (COMPOSITE)

INTERVAL	DEPTH
PLIOCENE	323
MIO-OLIG	5518
EO-PALEO	8603
CRET	9888
L.JUR.	12152

TABLE III

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SOURCE ROCK GEOCHEMICAL AND VISUAL KEROGEN DATA

2/7-B12 ELDFISK, NORWEGIAN SECTOR, NORTH SEA (WHOLE ROCK)

STRAT INTERVAL	SPL TYP	SAMPLE DEPTH FEET	TOTAL ORGANC CARBON TOC	S1 PEAK (TEM)	S2 PEAK	PRODUC TION INDEX PI	THERMAL EXTRAC- TION INDEX TEI	HYDRO GEN INDEX HI	VITRINTE REFLECTANCE (RO) MEAN	STD. DEV.	RO MODE	RO RANGE LOW	RO RANGE HIGH	PTS	THERMAL ALTERA- TION INDEX TAI	VISUAL KEROGEN NORMALIZED PERCENT OIL PRONE ALG	OIL PRONE EXI	GAS PRONE VIT	GAS PRONE INER	GEOCHEM SAMPLE CODE
MIO-OLIG	CUT	8300-8400	1.95	.46	4.33	.10	24	222	.49	.04		.46	.52	2	2-	90	5		5	EP84BLX
EO-PALEO	CUT	8900-9000	1.99	.73	4.97	.13	37	250							2-	89	5	5		EP84BLY
EO-PALEO	CUT	9500-9600	1.45	.32	1.90	.14	22	131	.53	.06	.49	.46	.62	13	2-	90	5	5		EP84BLZ
CRET	CUT	10100-10200	.47	.24	.87	.22	51	185							2-	45	5	40	10	EP84BMA
CRET	CUT	10700-10800	4.72	4.49	13.41	.25	95	284	.51	.09	.85	.42	.59	3	2	65	5	10	20	EP84BMH
CRET	CUT	10900-11000	.49	.47	1.70	.22	96	347							2	70	5	25		EP84BMC
CRET	CUT	11100-11200	2.59	.51	6.94	.07	20	268	.74	.08	.65	.61	.84	23	2+	35	5	50	10	EP84BMG
CRET	CUT	11300-11400	1.17	.35	1.55	.18	30	132							2+	50	5	40	5	EP84BME
VOLGIAN	CUT	11400-11450	5.45	1.22	9.26	.12	22	170												EP84CY
VOLGIAN	CUT	11500-11600	4.30	1.76	7.76	.18	41	180							2+					EP84BMI
VOLGIAN	CUT	11700-11800	11.19	5.50	52.17	.10	49	466	.74	.07	.69	.64	.83	12	3-	65	5	30		EP84BMQ
VOLGIAN	CUT	11900-12000	6.01	2.04	20.34	.09	34	338							3-	70	5	20	5	EP84BMF
VOLGIAN	CUT	12100-12200	5.41	2.59	16.10	.14	48	298	.67	.08	.70	.49	.76	13	2+	69	6	25		EP84BMJ
VOLGIAN	CUT	12100-12200	6.54	1.51	15.70	.09	23	240												EP84CX
VOLGIAN	CUT	12300-12400	7.87	3.04	19.53	.13	39	248	.58	.05	.64	.51	.65	18	3-	75	5	20		EP84BMJ
VOLGIAN	CUT	12500-12600	6.78	2.03	16.39	.11	30	242	.59	.05	.56	.53	.69	12		95		5		EP84BMD
VOLGIAN	CUT	12650-12750	7.05	1.55	11.46	.12	22	163	.76	.07	.64	.64	.88	22		40		60		EP84BMK
VOLGIAN	CUT	12850-12950	5.86	1.61	10.35	.13	27	177	.83	.05	.87	.73	.90	21	2+	60		40		EP84BMB
VOLGIAN	CUT	13050-13150	2.77	.84	3.64	.19	30	131	.79	.08	.96	.68	.89	7	3-	30	5	65		EP84BMR
VOLGIAN	CUT	13050-13150	2.47	.47	2.37	.17	19	96												EP84CXK
VOLGIAN	CUT	13250-13350	3.67	.60	2.56	.19	16	70	.91	.06	.91	.83	.99	10	3-	40		60		EP84BMO
VOLGIAN	CUT	13450-13550	4.14	.58	2.54	.19	14	61	.87	.07	.96	.74	.96	23	3	15	5	80		EP84BMP
VOLGIAN	CUT	13600-13700	3.13	.40	1.16	.26	13	37							3-	45	5	50		EP84BMN
VOLGIAN	CUT	13800-13900	5.02	.41	1.75	.19	8	35							3	45	5	45	5	EP84BMR
VOLGIAN	CUT	14000-14100	2.42	.40	1.17	.25	17	48							3	40	10	45	5	EP84BMS
VOLGIAN	CUT	14200-14300	2.10	1.32	3.75	.26	63	179	.98	.20	.97	.61	1.35	20	3	40	5	50	5	EP84BMM
VOLGIAN	CUT	14400-14500	2.66	.61	3.00	.17	23	113							3	30	5	60	5	EP84BMU

TABLE IV

EPS REPORT 2666A

PYROLYSIS RESULTS FOR SAMPLES FROM THE 2/7-B12 ELDFISK, NORWEGIAN SECTOR, N. SEA (ISOLATED KEROGEN)

STRAT. INTERVAL	SPL TYP	SAMPLE DEPTH FEET	TOTAL ORGANIC CARBON WT.%	S1 MG.HC/ G.ROCK	S2 MG.HC/ G.ROCK	PRODUCTION INDEX S1/(S1+S2)	THERMAL EXTRACTION INDEX MG/G.	HYDROGEN INDEX MG/G.	HYDROGEN TO CARBON ATOMIC RATIO	GEOCHEM SAMPLE CODE
MIO-OLIG	KER	8300-8400	27.59	11.34	123.60	.084	41.10	448.0	1.064	EP84BVY
EO-PALEO	KER	9500-9600	53.84	8.74	188.82	.044	16.23	350.7	.942	EP84BVZ
CRET	KER	10100-10200	20.49	4.86	38.19	.113	23.72	186.4	.735	EP84BWA
CRET	KER	10700-10800	31.02	12.13	102.39	.106	39.10	330.1	.916	EP84BWB
CRET	KER	11100-11200	51.52	7.82	160.76	.046	15.18	312.0	.893	EP84BWC
CRET	KER	11300-11400	43.56	9.14	148.72	.058	20.98	341.4	.930	EP84BWD
VOLGIAN	KER	11400-11450	62.26	35.19	265.73	.117	56.52	426.8	1.038	EP84CZM
VOLGIAN	KER	11700-11800	50.45	8.89	232.89	.037	17.62	461.6	1.082	EP84BWE
VOLGIAN	KER	11900-12000	50.45	54.45	150.57	.266	107.93	298.5	.876	EP84BWF
VOLGIAN	KER	12100-12200	34.28	13.45	84.48	.137	39.24	246.4	.811	EP84BWG
VOLGIAN	KER	12300-12400	45.59	6.10	128.98	.045	13.38	282.9	.856	EP84BWH
VOLGIAN	KER	12500-12600	46.91	7.59	128.68	.056	16.18	274.3	.846	EP84BWI
VOLGIAN	KER	12650-12750	60.83	9.30	147.59	.059	15.29	242.6	.806	EP84BWJ
VOLGIAN	KER	12850-12950	54.16	9.49	123.42	.071	17.52	227.9	.787	EP84BWK
VOLGIAN	KER	13050-13150	51.38	39.33	96.77	.289	76.55	188.3	.737	EP84BWL
VOLGIAN	KER	13250-13350	42.00	26.19	65.27	.286	62.36	155.4	.696	EP84BWM
VOLGIAN	KER	13450-13550	56.98	17.12	59.06	.225	30.05	103.7	.631	EP84BWN
VOLGIAN	KER	13600-13700	64.20	16.76	48.92	.255	26.11	76.2	.596	EP84BWO
VOLGIAN	KER	13800-13900	57.05	9.39	25.88	.266	16.46	45.4	.557	EP84BWP
VOLGIAN	KER	14000-14100	51.30	44.75	58.65	.433	87.23	114.3	.644	EP84BWQ
VOLGIAN	KER	14200-14300	44.90	38.14	50.70	.429	84.94	112.9	.642	EP84BWR
VOLGIAN	KER	14400-14500	12.36	5.64	14.59	.279	45.63	118.0	.649	EP84BWS

BIOSTRATIGRAPHY
(COMPOSITE)

INTERVAL	DEPTH
PLIOCENE	377
MIO-OLIG	5464
EO-PALEO	8603
CRET	9733
VOLGIAN	11400

G=GREEN
Y=YELLOW
O=ORANGE
B=BROWN
N=NIL

HIGH INTENSITY/ VERY ABUNDANT
INTENSE/ ABUNDANT
MEDIUM INTENSITY/ COMMON
LOW INTENSITY/ RARE
VERY LOW INTENSITY/ VERY RARE
NIL/ABSENT

M=METERS
F=FEET

2/7-1 NORWAY

FLUORESCENCE COLOR & INTENSITY (SUBJECTIVE) (BLUE LT. FLUOR.)

EPS REPORT NO. 2666A

TABLE V

	INCREASING MATURITY → POLLEN/SPORE					AMORPHOUS KEROGEN					MOUNTING MEDIUM			
	G	Y	O	B	N	G	Y	O	B	N	G	Y	N	COMMENTS
12,100-12,120'			X					X				—		COALY
12,160-12,180'			X					X				—		COALY
12,200-12,260'			X					X				—		COALY
12,410-12,490'			X					X	X			—		COALY
12,610-12,765'			X					X				—		COALY
12,765-12,795'			X					X				—		COALY
12,795-13,000'			X					X				—		COALY
13,000-13,290'			X					X						
13,300-13,650'		X	X					X						
13,670-13,810'				X					X					
13,820-13,840'				X					X					
13,870-13,990'				X					X					COALY
14,275-14,290'				X					X			—		COALY
14,290-14,335'				X					X			—		
14,340-14,440'			X	X					X			—		COALY
14,440-14,540'				X					X			—		
14,540-14,640'				X					X			—		COALY
14,640-14,730'				X					X					

G=GREEN
Y=YELLOW
O=ORANGE
B=BROWN
N=NIL

HIGH INTENSITY/ VERY ABUNDANT
INTENSE/ ABUNDANT
MEDIUM INTENSITY/ COMMON
LOW INTENSITY/ RARE
VERY LOW INTENSITY/ VERY RARE
NIL/ABSENT

M=METERS
F=FEET

2/7-B12 NORWAY

FLUORESCENCE COLOR & INTENSITY (SUBJECTIVE) (BLUE LT. FLUOR.)

EPS REPORT NO. 2666A

TABLE VI

	INCREASING MATURITY → POLLEN/SPORE					AMORPHOUS KEROGEN					MOUNTING MEDIUM			
	G	Y	O	B	N	G	Y	O	B	N	G	Y	N	COMMENTS
8300-8390'		X	X				X				—			CONTAMINATED
8900-9000'		X	X				X				—			CONTAMINATED
9500-9600'			X				X	X			—			BITUMENS
10,100-10,200'		X	X				X	X			—			BITUMENS
10,700-10,800'			X								—			BITUMENS
10,900-11,000'		X	X					X			—			COALY
11,100-11,200'			X				X	X			—			?OXIDIZED?
11,300-11,400'			X					X			—	—		COALY
11,500-11,600'			X	X			X	X			—			
11,700-11,800'			X	X				X				—		
11,900-12,000'			X	X				X			—	—		
12,100-12,200'		X	X	X			X	X			—	—		COALY
12,300-12,400'		X	X	X			X	X			—	—		COALY
12,500-12,600'								X			—			COALY
12,650-12,750'								X	X		—			?OXIDIZED?
12,850-12,950'				X				X	X		—			COALY
13,050-13,150'			X	X				X	X			—		COALY
13,250-13,350'			X	X					X	X	—	—		COALY
13,450-13,550'				X					X	X	—			
13,600-13,700'														?OXIDIZED?
13,800-13,900'				X						X	—	—		COALY
14,000-14,100'				X						X	—	—		COALY
14,200-14,300'			X	X				X	X		—			COALY
14,400-14,500'			X	X				X	X		—	—		COALY

TABLE VII

EPS REPORT 2666A

2/7-1 Well, SRP Evaluation from Modified QEST Method

	Present Evaluation					Original Evaluation (Ro = 0.5%)		
	Whole Rock	Visual	HI		Kerogen	HI	Peak	Kerogen
Depth	TOC	Kerogen	Cuttings	Kerogen	Generation Product	Kerogen	BAF	Generation Product
12,160-180	5.5	oil	200	460	oil	640	209	oil
12,200-260	3.0	oil	227	332	oil	465	78	oil
12,410-490	2.4	oil/gas	208	253	oil/gas	365	47	oil
12,610-765	2.1	oil/gas	184	263	gas/oil	425	49	oil
12,765-795	2.4	oil	179	247	gas/oil	365	47	oil
12,795-13,000	2.5	oil	168	218	gas/oil	328	43	oil
13,000-290	2.4	oil/gas	195	235	gas/oil	355	45	oil
13,300-650	4.0	oil/gas	159	215	gas/oil	335	71	oil
13,670-810	8.7	oil/gas	170	200	gas/oil	300	139	oil/gas
13,820-840	20.8	oil	198	194	gas/oil	300	332	oil/gas
13,870-990	4.5	oil/gas	140	174	gas	249	58	gas/oil
14,275-290	5.6	oil	140	154	gas	243	67	gas/oil
14,290-335	6.8	oil	149	183	gas	281	103	oil/gas
14,340-440	9.4	oil	136	166	gas	250	122	gas/oil
14,440-540	9.4	oil	115	136	gas	225	104	gas/oil
14,540-640	6.7	oil	134	137	gas	205	67	gas/oil
14,640-730	6.9	oil	102	131	gas	205	69	gas/oil

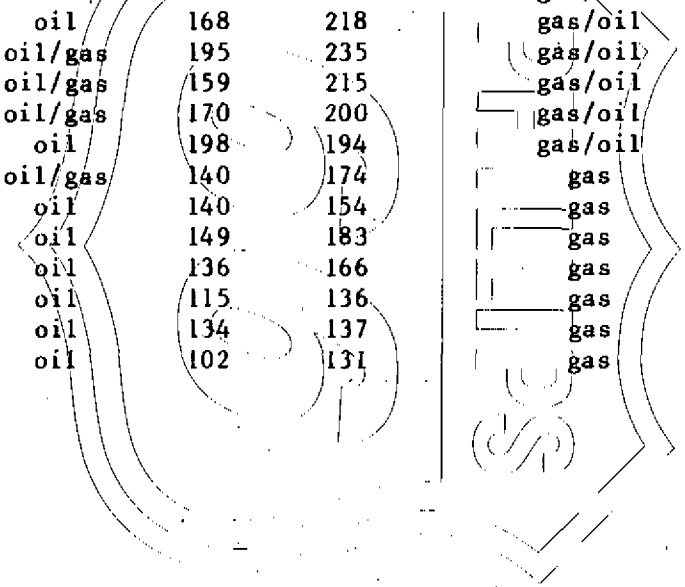

TABLE VIII

EPS REPORT 2666A

2/7-B12 Well, SRP Evaluation from Modified QEST Method

	Present Evaluation					Original Evaluation (Ro = 0.5%)		
	Whole Rock	Visual	HI		Kerogen	HI	Peak	Kerogen
Depth	TOC	Kerogen	Cuttings	Kerogen	Generation Product	Kerogen	BAF	Generation Product
11,400-450	5.5	-	170	427	oil	490	153	oil
11,700-800	11.2	oil	466	462	oil	520	330	oil
11,900-12,000	6.0	oil	338	298	oil	333	114	oil
12,100-12,200	5.4	oil	298	246	oil/gas	275	67	medium oil/gas
12,300-400	7.9	oil	248	283	oil/gas	290	122	medium oil/gas
12,500-600	6.8	oil	242	274	oil/gas	290	102	medium oil/gas
12,650-750	7.1	gas	163	243	gas/oil	290	106	medium oil/gas
12,850-950	5.9	oil/gas	177	228	gas/oil	290	88	medium oil/gas
13,050-150	2.8	gas	131	188	gas	242	30	gas/oil
13,250-350	3.7	gas	70	155	gas	215	37	gas/oil
13,450-550	4.1	gas	61	104	gas	140	23	gas
13,600-700	3.1	gas	37	76	gas	105	9	gas
13,800-900	5.0	gas	35	45	gas	70	5	gas
14,000-100	2.4	gas	48	114	gas	170	18	gas
14,200-300	2.1	gas	179	113	gas	170	16	gas
14,400-500	2.7	gas	113	118	gas	170	20	gas

WELL LOG PLOT

COMPANY PHILLIPS PETROLEUM CO. DATE 082579

WELL 2-7 IX FIELD ELDFISK

COUNTY NORTH SEA STATE NORWAY

ANALYST A.B.CROWELL DATE ANALYZED JUNE 5, 1981, 12:59

DEPTH - MEASURED

COMMENTS: COMPLEX LITHOLOGY ANALYSIS **FIELD STUDY-DATA NORMALIZED**
VSH FROM GR,RSH=.98,REN-SH=2.35,REN-SH=3GI
RW=.842 @ 245F,M=1,M=2.00,DAN.,UP.CRET.

DANIAN 9610-9829,UP.CRET.9838-10150,RHO-NYD=.75

DEPTH	GRC API	SW	POR E	VSH E
	0 125	100 0	50 0	0 100
	DEN(MA)		BVSXU	POR E
	2.5 3		50 0	100 0
			BVW	
			50 0	
		DEL CAL INCHES		
		-20	20	
			RHYD MHYD	SHLE MATR
9600				
9700				
9800				
9900				
10000				
10100				

WELL LOG PLOT

COMPANY PHILLIPS PETROLEUM CO.
DATE 120770
WELL 2/7 1X
FIELD ELDFISK
COUNTY OFFSHORE
STATE NORTH SEA
ANALYST W H HOLM
DATE ANALYZED SEP. 19, 1979. 9:06
DEPTH - MEASURED

COMMENTS: ***COMPLEX LITHOLOGY ANALYSIS-HAND DIGITIZED DATA***
VSH FROM GR
RW=.020310
RSH=1.5,DEN-SH=2.45, POR-SH=25, A=.62, M=2.15