VITRINITE REFLECTANCE DATA

WELL: DAVID RIVER (ADDITIONAL DATA)
LOCATION: BRISTOL BAY ALASKA

DEPTH (ft)	REFLECTANCE VALUES(%Ro)	COMMENTS
7130	.69(14).54(7)	STR BW+S BS/PL V PAR+W/PL COAL FR (LT-M O FL)
7130	.86(1)	STR BW+S BS/PL V PAR+W/PL COAL FR (LT-M O FL)
7250	.7(20)	BW+SBS/PL COAL FR+VW IN SLT/OX (M O FL)
7380	.74(20)	BW/PL VST+W+PAR (M O FL)
7530	.92(7).8(3)	BW+BS/PL VW+PAR (M O FL)
7530	.71(9)	BW+BS/PL VW+PAR (M O FL)
7680	.78(20)	BW+S BS/V PAR+W (M O FL)
7870	.47(9).76(11)	S BS+W/LOW Ro-LGN/HIGH Ro-VW IN SLT/OX
8000	.67(5).75(15)	S BS+PL W/V PAR+W
8320	.97(20)	BW+S BS/PL VST+W+PAR/OX
8580	.92(4).76(2)	BW+S BS/PL GOOD VST (M O FL)
8580	1.07(14)	BW+S BS/PL GOOD VST (M O FL)
8750	.91(3)1.03(16)	SH-STR BS/PL GOOD VST/COAL-V (M O FL)
8900	.82(4).99(17)	BW+BS/GN VW+PAR/OX (M O FL)
9400	.98(4).75(5)	STR BW+S BS/VW+PAR-VARIABLE Ro/OX (M O FL)
9400	.86(11)	STR BW+S BS/VW+PAR-VARIABLE Ro/OX (M O FL)
9600	1.19(23)	STR BS IN SH/PL VST IN CARB/S COAL/OX
10050	1.01(2)1.48(19)	SH-HEAVY BS/COAL-STRUCTURELESS/OX (M O FL)
10610	.96(11)1.21(10)	OBS+BW/VW+PAR
11300	1.25(20)	BW+S BS/VST+W/S COAL PAR
11800	0(0)	NDP
12140	0(0)	NDP
12780	1.75(21)	STR BS/V+I PAR-SMALL
13660	1.32(5)	STR OBS/TR SP V+I

FIGURES IN PARENTHESES INDICATE NUMBER OF READINGS

TABLE 1

VITRINITE REFLECTANCE DATA

WELL: DAVID RIVER-1A
LOCATION: BRISTOL BAY ALASKA

DEPTH (ft)	REFLECTANCE VALUES(%Ro)	COMMENTS
540	.28(24)	BW/S BS/LOW CONTENT V W+PAR (Y/O FL)
1170	.25(22)	G CLEAN LGN/RES RICH
1500	.3(19)	S BW/TR V PAR IN SH/ S OX (Y/O FL)
2210	.33(14).23(1)	BW/TR V PAR+W PAR/S OX
2210	.48(1)	BW/TR V PAR+W PAR/S OX
2660	.45(17).35(3)	BW/S VW+PAR/S OX (Y/O FL)
2660	.56(1)	BW/S VW+PAR/S OX (Y/O FL)
3320	.45(14).59(4)	PL BW/VW+PAR (Y/O FL)
3320	.34(2)	PL BW/VW+PAR (Y/O FL)
3710	.64(16).45(7)	V PAR+W-GN/VARIABLE Ro (Y O+LT O FL)
4050	.57(14).46(3)	PL BW/V PAR+W (Y-LT O)
4050	.7(5)	PL BW/V PAR+W (Y-LT O)
4320	.53(21).36(1)	S BS+W IN SH/COAL-LGN (LT O FL)
4590	.58(14).7(7)	STR BS+W IN SH/PL V PAR+ST/COAL FR/S OX (LT O FL)
4590	.44(1)	STR BS+W IN SH/PL V PAR+ST/COAL FR/S OX (LT O FL)
4980	.64(16).53(3)	STR OBS+W/COAL FR+PL VST+W+PAR/OX (LT-M O FL)
4980	.84(3)	STR OBS+W/COAL FR+PL VST+W+PAR/OX (LT-M O FL)
5310	.61(8).49(10)	STR BS+W/VST+PAR/CTGS OX (DULL M O FL)
5310	.74(1)	STR BS+W/VST+PAR/CTGS OX (DULL M O FL)
5480	.71(11).55(6)	S BS+PL W/V PAR+W-PL LGN FR (M O FL)
5800	.67(20)	STR BS/PL CPAL FR/OX
5990	.69(17).54(3)	STR BS+W/PL VST+PAR/OX (M O FL)
5990	.42(1)	STR BS+W/PL VST+PAR/OX (M O FL)
6250	.63(8).52(13)	STR BS+BW/R COAL FR+VW+PAR (M O FL)
6460	.71(17).63(6)	STR BS+W/PL COAL FR+V PAR/OX
6630	.75(17).65(3)	PL STR BW+S BS/PL V PAR+W-COAL FR/OX (M O FL)
6700	.64(11).77(9)	S BS+W/PL V PAR+W/PL COAL FR/OX (M O FL)
6700	.88(1)	S BS+W/PL V PAR+W/PL COAL FR/OX (M O FL)
6840	.76(10).64(7)	STR BS+PL W/PL COAL FR+PL VW+PAR/OX (M O FL)

FIGURES IN PARENTHESES INDICATE NUMBER OF READINGS
SEE LIST OF ABBREVIATIONS OVERLEAF

TABLE 1A

VITRINITE TABLE ABBREVIATIONS

ANS - ANISOTROPIC
BS - BITUMEN STAINING
BAR - VIRTUALLY BARREN
CARB - CARBARGILITE
CTGS - CUTTINGS
DMA - DRILLING MUD ADDITIVE
F - FEW
FR - FRAGMENTS
GN - GNARLED
I - INERTINITE
IGN - IGNEOUS TRACES
L - LOW ORGANIC CONTENT
LOW - LOWEST REFLECTANCES MEASURED
MOD - MODERATE ORGANIC CONTENT
NTV - NO TRUE VITRINITE
OCC - OCCASIONAL
P - POOR
PL - PLENTIFUL-PLENTY
R - REWORKED
RO - REFLECTANCE MEASUREMENT
RICH - RICH-HIGH ORGANIC CONTENT
SC - SCRUFFY
SLT - SILTSTONE
SP - SPECKS
STC - STRUCTURE
TB - TURBO-DRILLED
TEL - TELINITIC
VL - V.LOW ORGANIC CONTENT
VAR - VARIABLE (HIGH) RO
W - WISPS-WISPY
* - ALLOCTHONOUS
? - QUESTIONABLE
BL - BLEBS

B - BITUMEN
BW - BITUMEN WISPS
CAV - CAVED
COR - CORRODED
DD - DIFFERENTIATION DIFFICULT
DOM - DOMINANT
FL - FLUORESCENCE
G - GOOD
GRAN - GRANULARITY
INST - INTERSTITIAL
IRON - IRON OXIDES
LGN - LIGNITE
M - MOSTLY
NDP - NO DETERMINATION POSSIBLE
OBS - OVERALL BITUMEN STAINING
OX - INDICATIONS OF OXIDATION
PAR - PARTICLES
POS - POSSIBLY
RM - REWORKED MATERIAL
RES - RESIN
S - SOME
SH - SHALE
SML - SMALL
SUB - SUBORDINATE
STR - STRONGLY
TR - TRACE
V - VITRINITE
VW - VITRINITE WISPS
VST - VITRINITE STRINGERS
WH - WHOLLY
= - EQUAL PROPORTIONS

PHY - PHYTOCLASTS (CONTENT)

(SPORE FLUORESCENCE COLOURS UNDER U.V. LIGHT)

G - GREEN
O - ORANGE
LT - LIGHT
D - DEEP

Y - YELLOW
R - RED
M - MID
P - PALE

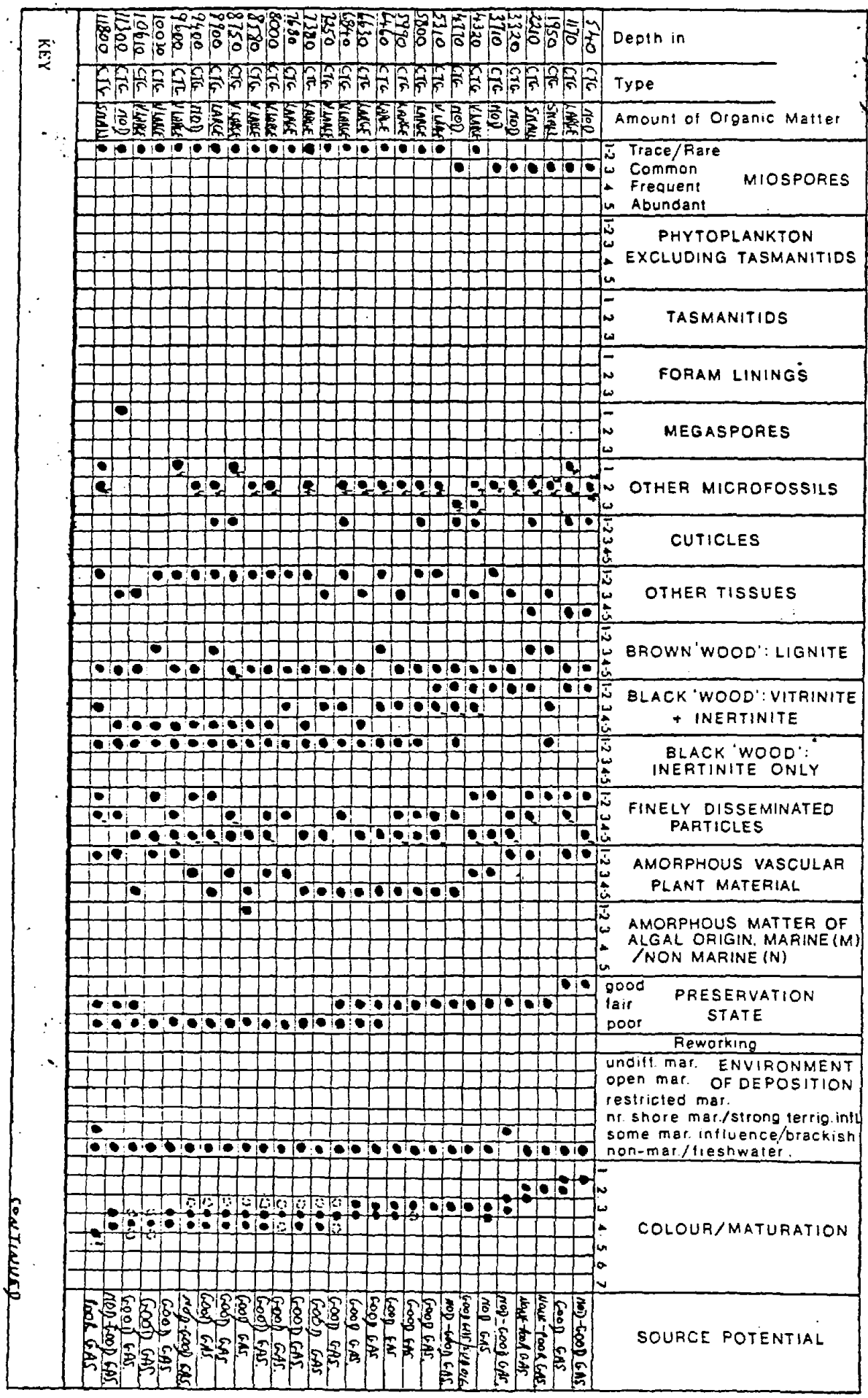
TABLE 2

VISUAL KEROGEN DESCRIPTIONS

WELL: DAVID RIVER-1A
LOCATION: BRISTOL BAY ALASKA

DEPTH(ft)	SPORE COLOUR	ESTIMATED SOURCE POTENTIAL
540	1/2	MODERATE-GOOD GAS
1170	1/2	GOOD GAS
1950	2	NONE-POOR GAS
2210	2-2/3	NONE-POOR GAS
3320	2/3-3	MODERATE-GOOD GAS
3710	3-3/4	MODERATE GAS
4320	3	GOOD GAS/SUB OIL
4770	3	MODERATE-GOOD GAS
5310	3	GOOD GAS
5800	3-3/4	GOOD GAS
5990	3-3/4	GOOD GAS
6460	3-3/4	GOOD GAS
6630	3-3/4	GOOD GAS
6840	3/4	GOOD GAS
7250	3/4-4	GOOD GAS
7380	3/4-4	GOOD GAS
7680	3/4	GOOD GAS
8000	3/4-4	GOOD GAS
8580	3/4-4	GOOD GAS
8750	3/4-4	GOOD GAS
8900	3/4-4	GOOD GAS
9400	3/4-4	MODERATE-GOOD GAS
9600	3/4-4	GOOD GAS
10030	4	GOOD GAS
10610	4	GOOD GAS
11300	3/4-4	MODERATE-GOOD GAS
11800	4/5	POOR GAS
12250	4/5	NONE-POOR GAS
12780	4/5	NONE
13350	4/5	NONE
13660	5-5/6	NONE

DAVID RIVER 1A



DAVID RIVER 1A

KEY
1 ISS SLIDE ONLY
2 CHITINOZOA
3 FUNGAL REMAINS
4 BLACK WOODS DISTANT
5 BOTRYOCOCCUS
6 SOME ASTRIDOS

Depth in	Type	Amount of Organic Matter	
11950	CTG	SMALL	
12780	CTG	V SMALL	
13350	CTG	SMALL	
13660	CTG	V SMALL	

1-2 3 4 5	Trace/Rare Common Frequent Abundant	MIOSPORES
1-2 3 4 5		PHYTOPLANKTON EXCLUDING TASMANITIDS
1 2 3		TASMANITIDS
1 2 3		FORAM LININGS
1 2 3		MEGASPORES
1 2 3		OTHER MICROFOSSILS
1-2 3 4-5		CUTICLES
1-2 3 4-5		OTHER TISSUES
1-2 3 4-5		BROWN 'WOOD': LIGNITE
1-2 3 4-5		BLACK 'WOOD': VITRINITE + INERTINITE
1-2 3 4-5		BLACK 'WOOD': INERTINITE ONLY
1-2 3 4-5		FINELY DISSEMINATED PARTICLES
1-2 3 4-5		AMORPHOUS VASCULAR PLANT MATERIAL
1-2 3 4 5		AMORPHOUS MATTER OF ALGAL ORIGIN. MARINE (M) /NON MARINE (N)
	good fair poor	PRESERVATION STATE
		Reworking
	undiff. mar. open mar. restricted mar. nr. shore mar./strong terrig. infl some mar. influence/brackish non-mar./freshwater	ENVIRONMENT OF DEPOSITION
1 2 3 4 5 6 7		COLOUR/MATURATION
		SOURCE POTENTIAL

TABLE 3

ROCK-EVAL AND PYROLYSIS DATA

WELL: DAVID RIVER-1A
LOCATION: BRISTOL BAY ALASKA

DEPTH (ft)		P1 KG/TONNE	P2 KG/TONNE	GOGI	TOC (%wt)	HYDROGEN INDEX
540		0	1.1		2	54
1170		0	.3		.85	35
1500		0	0			
1950		0	0			
2210		0	0			
2660		0	.6		1.5	40
2660	COAL	1.6	80			
3320		0	1		1.5	66
3710		0	.2		.78	25
4050		0	.9		1.6	56
4140		0	1.2		2.1	57
4140	COAL	1.4	55.4			
4590		0	.7		1	70
4590	COAL	.2	21	.88		
4770		0	0			
4770	COAL	.3	21.3	.99		
4980		.1	15.5	.83	17.1	90
5310		0	.5		1.6	31
5480		0	.5		1.2	41
5480	COAL	1.7	45.7	.65		
5710		0	.8		1.8	44
5800		.7	20.6	.65	14.6	141
5900		0	.6			
6130		0	.7		2.4	29
6130	COAL	.6	41.2			
6250	COAL	.6	31.8	.87	26	122
6460		.1	2.7	.94	5.7	47
6630		0	.8		3.1	25
6630	COAL	1.1	69.1			
6700		.1	3.1	.99	4	77
6840		.1	1.8		3.3	54
6970		0	.6		1.9	31
7130		.1	2.4	.81	3.2	75
7250		0	1.4		2.3	60
7380		.1	2.5	.85	3	83

TABLE 3

ROCK-EVAL AND PYROLYSIS DATA

WELL: DAVID RIVER (ADDITIONAL DATA)
LOCATION: BRISTOL BAY ALASKA

DEPTH (ft)	P1 KG/TONNE	P2 KG/TONNE	GOGI	TOC (%wt)	HYDROGEN INDEX
7530	0	1.2		2.3	52
7680	.1	2.9	.92	2.2	131
7810	0	1		2.3	43
8000	0	.6		2.1	28
8320	0	.6		2	30
8450	.1	2.5		16.5	15
8580	.1	2.2		2.3	95
8680	0	1.7			
8680 COAL	1.3	45.3			
8750	0	1.6		1.9	84
8750 COAL	.7	30	.84	22.7	132
8900	0	.3		1.5	20
9070	0	.5		.84	59
9400	0	.1		.92	10
9600	0	.9		1.6	56
9600 COAL	.2	7.5	1.08	15.8	47
9750	0	.3		2	15
9750 COAL	.4	26.8			
9950	.1	1.9		2.4	79
10050	.2	3.1	1.45	12.9	24
10300	0	1		2.8	35
10300 COAL	6	16			
10610	0	.3		1.5	20
10900	0	.4		1.2	33
10900 COAL	.2	2.7			
11300	0	.3		2	15
11580	.1	2		2	100
11580 COAL	1.1	19.3			
11800	.1	.7		1.7	41
12140	0	.1		.4	25
12250	.1	0			
12520	.1	.2		.91	21
12780	0	0			
13060	0	0			
13350	0	0			
13660	0	0			

TABLE 4

LITHOLOGY AND TOC DATA

WELL: DAVID RIVER-1A
LOCATION: BRISTOL BAY ALASKA

DEPTH(ft)	AGE/FM	PICKED LITHOLOGY	%TOC	%CARBONATE
540	QUAT/MILK RVR	C-MUDSTONE	2	18.6
1170	QUAT/MILK RVR	C-SANDSTONE	0.85	21
1500	QUAT/MILK RVR	C-SANDSTONE	0.13	14.4
1950	EOCENE/BEAR L	C-SANDSTONE	0.06	16.5
2210	EOCENE/BEAR L	C-MUDSTONE	0.12	18.4
2660	EOCENE/BEAR L	C-MUDSTONE	1.5	24
3320	EOCENE/BEAR L	C-SILTSTONE	1.5	10.8
3710	EOCENE/BEAR L	C-SILTSTONE	0.78	15.8
4050	EOCENE/BEAR L	C-SILTSTONE	1.6	13
4140	EOCENE/BEAR L	C-SILTSTONE	2.1	18.7
4320	EOCENE/BEAR L	C-SILTSTONE	2.4	21.8
4590	EOCENE/STEPOVAK	C-SILTSTONE	1	18.72
4770	EOCENE/STEPOVAK	C-SILTSTONE	1.4	17.2
4980	EOCENE/STEPOVAK	C-COAL	17.1	15.2
5310	EOCENE/STEPOVAK	C-SILTSTONE	1.6	24.3
5480	EOCENE/STEPOVAK	C-SILTSTONE	1.2	23
5710	EOCENE/STEPOVAK	C-SILTSTONE	1.8	19.2
5800	EOCENE/STEPOVAK	C-COAL	14.6	19.5
5800	EOCENE/STEPOVAK	C-SILTSTONE	1.3	26.5
5990	EOCENE/STEPOVAK	C-SILTSTONE	1.1	14.2
6130	EOCENE/STEPOVAK	C-SILTSTONE	2.4	19.9
6250	EOCENE/STEPOVAK	C-SILTSTONE	2	15.3
6250	EOCENE/STEPOVAK	C-COAL	26	11.7
6460	EOCENE/STEPOVAK	C-SILTSTONE	5.7	13
6630	EOCENE/STEPOVAK	C-SILTSTONE	3.1	10.9
6700	EOCENE/STEPOVAK	C-SILTSTONE	4	20.1
6840	EOCENE/STEPOVAK	C-SILTSTONE	3.3	17.7
6970	EOCENE/STEPOVAK	C-SILTSTONE	1.9	12.5
7130	EOCENE/STEPOVAK	C-SILTSTONE	3.2	14.3
7250	EOCENE/STEPOVAK	C-SILTSTONE	2.3	17.8
7380	EOCENE/TOLSTOI	C-SILTSTONE	3	17.2

SAMPLE TYPES :-
N-CORE SAMPLE
S-SIDEWALL CORE
O-OUTCROP
C-CUTTINGS

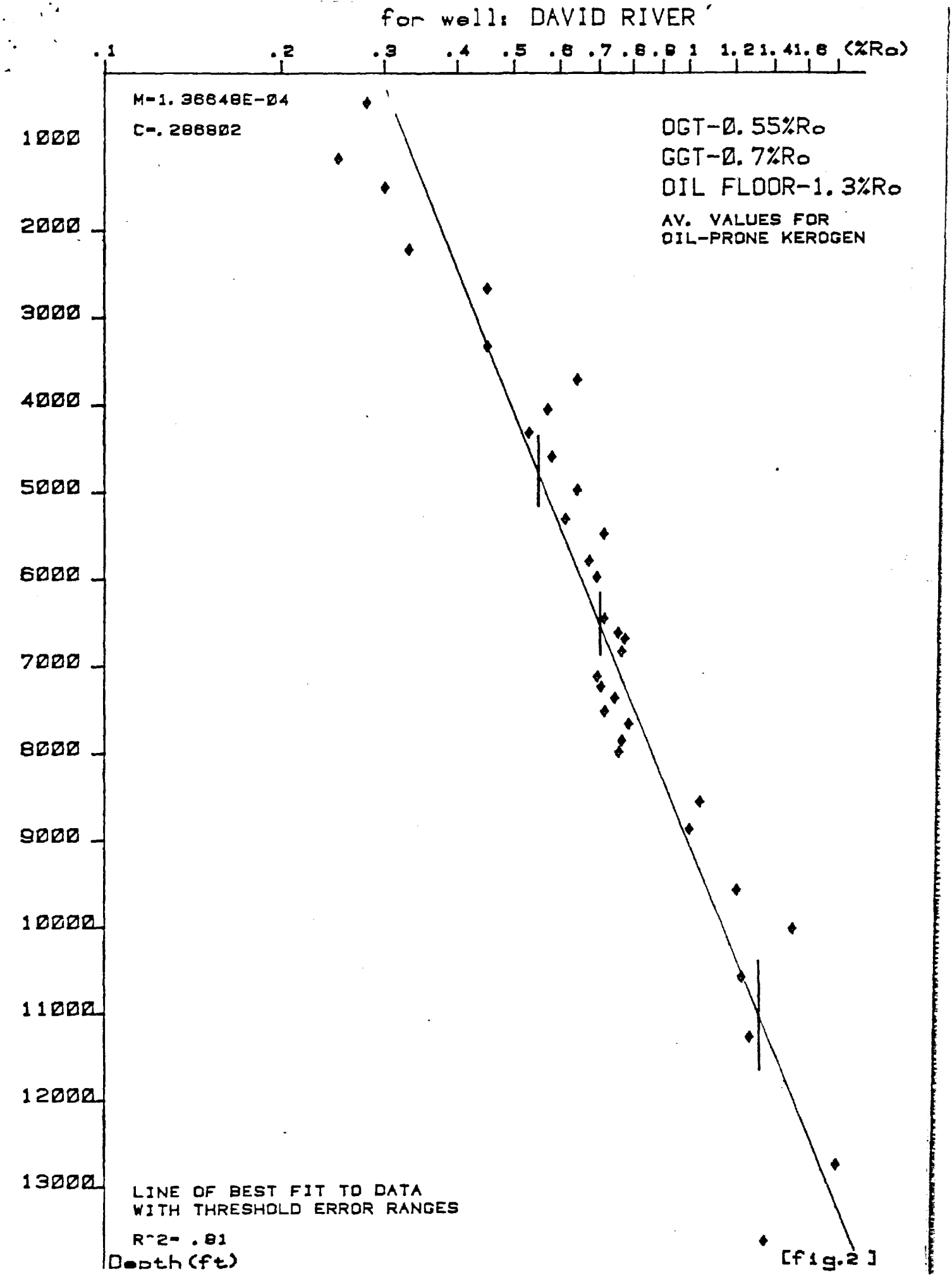
TABLE 4

LITHOLOGY AND TOC DATA

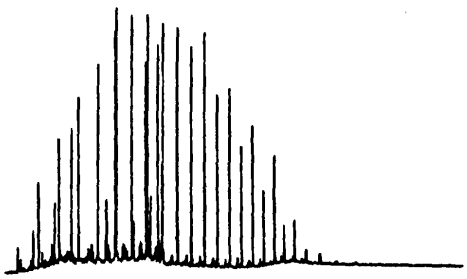
WELL: DAVID RIVER (ADDITIONAL DATA)
LOCATION: BRISTOL BAY ALASKA

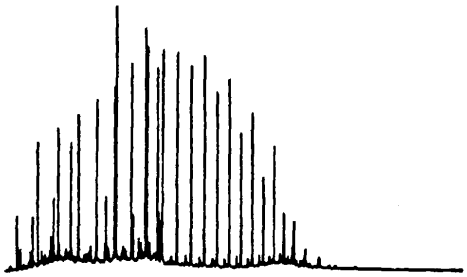
DEPTH(ft)	AGE/FM	PICKED LITHOLOGY	%TOC	%CARBONATE
7530	EOCENE/TOLSTOI	C-SILTSTONE	2.3	15
7680	EOCENE/TOLSTOI	C-SILTSTONE	2.2	16.9
7810	EOCENE/TOLSTOI	C-SILTSTONE	2.3	14.3
8000	EOCENE/TOLSTOI	C-SILTSTONE	2.1	14.4
8320	EOCENE/TOLSTOI	C-SILTSTONE	2	11.2
8450	EOCENE/TOLSTOI	C-COAL/SILTST	16.5	25.8
8580	EOCENE/TOLSTOI	C-SILTSTONE	2.3	22.5
8750	EOCENE/TOLSTOI	C-SILTSTONE	1.9	15.7
8750	EOCENE/TOLSTOI	C-COAL	22.7	28.1
8900	EOCENE/TOLSTOI	C-SILTSTONE	1.5	18.5
9070	EOCENE/TOLSTOI	C-SILTSTONE	0.84	16.4
9400	EOCENE/TOLSTOI	C-SILTSTONE	0.92	19.3
9600	EOCENE/TOLSTOI	C-SILTSTONE	1.6	24.9
9600	EOCENE/TOLSTOI	COAL/SILTST	15.8	19.6
9600	EOCENE/TOLSTOI	COAL/SILTST	15.8	19.6
9750	EOCENE/TOLSTOI	C-SILTSTONE	2	16
9950	EOCENE/TOLSTOI	C-SILTSTONE	2.4	18.5
10050	EOCENE/TOLSTOI	C-COAL/SILTST	12.9	13.1
10300	EOCENE/TOLSTOI	C-SILTSTONE	2.8	14.4
10610	EOCENE/TOLSTOI	C-SILTSTONE	1.5	14.7
10900	EOCENE/TOLSTOI	C-SILTSTONE	1.2	15.2
10900	EOCENE/TOLSTOI	C-SILTSTONE	1.2	15.2
11300	EOCENE/TOLSTOI	C-SILTSTONE	2	15.7
11580	EOCENE/TOLSTOI	C-SILTSTONE	2	15.5
11800	CRET/CHIGNIK	C-SILTSTONE	1.7	12.8
12140	CRET/CHIGNIK	C-SILTSTONE	0.4	8.4
12250	CRET/CHIGNIK	C-SILTSTONE	0.73	15.6
12520	CRET/CHIGNIK	C-SILTSTONE	0.91	13.5
12780	CRET/CHIGNIK	C-SILTSTONE	0.4	12.3
13060	CRET/CHIGNIK	C-SILTSTONE	0.53	11.5

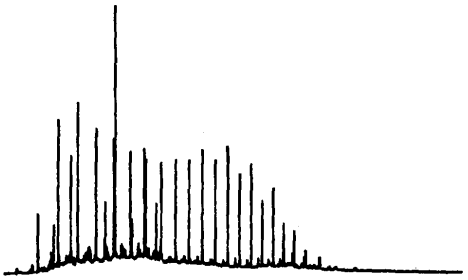
SAMPLE TYPES :-
N-CORE SAMPLE
S-SIDEWALL CORE
O-OUTCROP
C-CUTTINGS

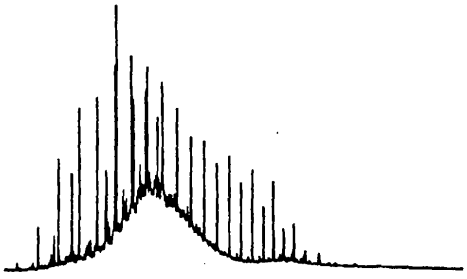

for well: DAVID RIVER
.1 .2 .3 .4 .5 .6 .7 .8 .9 1 1.2 1.4 1.6 (%Ro)
M=1.36648E-04
C=.286802
OGT-0.55%Ro
GGT-0.7%Ro
OIL FLOOR-1.3%Ro
AV. VALUES FOR
OIL-PRONE KEROGEN
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
LINE OF BEST FIT TO DATA
WITH THRESHOLD ERROR RANGES
R^2= .81
Depth (ft)

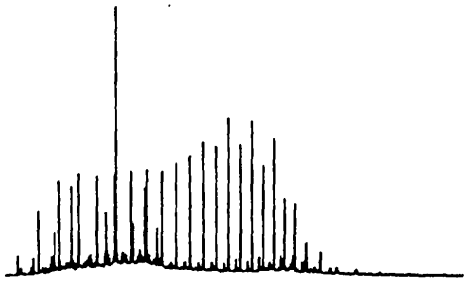
[fig.2]







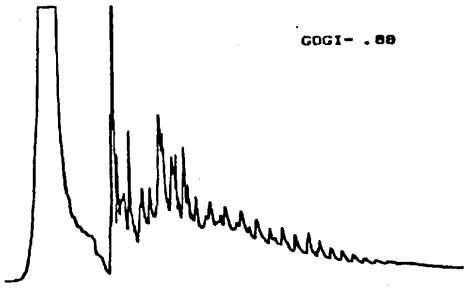


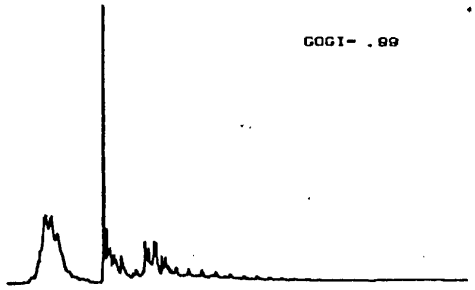


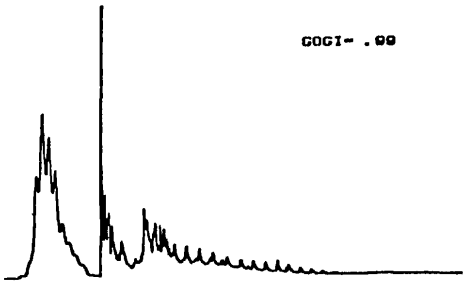
GEOCHEMISTRY BRANCH, BP SUNBUR
OPERATIONS GROUP

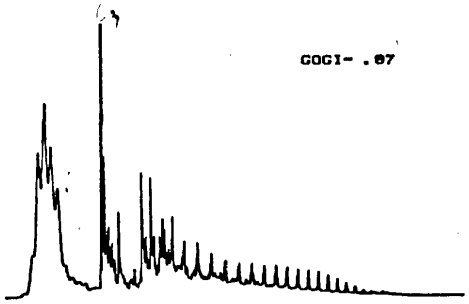
SAC FRACTION GAS CHROMATOGRAMS

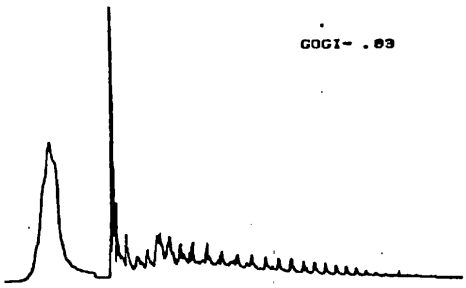
[fig.3







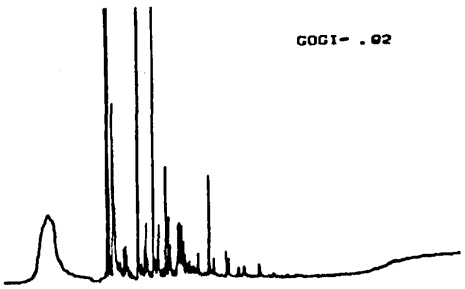


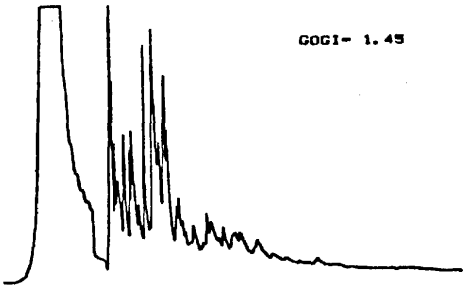


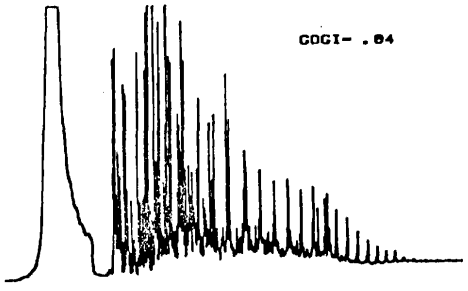
GEOCHEMISTRY BRANCH, BP SUNBURY OPERATIONS GROUP

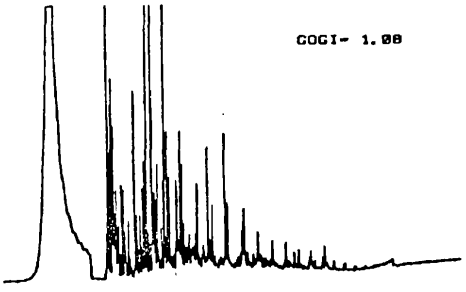
KEROGEN PYROLYSATES (P2)

[fig.4]









GEOCHEMISTRY BRANCH, BP SU
OPERATIONS GROUP

KEROGEN PYROLYSATES (P2

[

WELL: DAVID - RIVER - 1A

LOCATION: BRISTOL BAY, ALASKA.

OPERATOR: PAN AMERICAN.

Date Spudded: 11/6/68
Date Completed: 31/6/69
TD: 13769 ft

BP RESEARCH CENTRE, SUNBURY. OPERATIONAL SERVICES GROUP.

PETROLEUM GEOCHEMICAL LOG

SCALE = 1 : 10,000

MATURITY INDICATORS

SPORE COLOUR — IMMATURE / THRESHOLD* / MATURE — 1, 2, 3, 4, 5, 6, 7

VITRINITE REFLECTANCE % — IMMATURE / THRESHOLD* 0.55 / PEAK OIL 0.8 / OIL FLOOR 1.3 — 0.2

GENERATION INDICES ‰ — TSE TOC ● — 100; SAC TOC □ — THRESHOLD* 30

CARBON PREFERENCE INDEX — 2.0 — 1.0

KEY:
- ● AUTOCHTHONOUS
- ○ ALLOCHTHONOUS
- △ PROBABLE
- △ POSSIBLE
- + BITUMEN STAINING AND / OR WISPS.

GEOLOGICAL AND WELL DATA

Sample No. / STRATIGRAPHY / Depth Drilled ft & m / Graphic Log / Picked Log

- QUATERNARY
- TERTIARY
  - POSSIBLE EOCENE
    - MILK RIVER FORMATION
    - ? BEAR LAKE FORMATION
    - STEPOVAK FORMATION
    - EOCENE
    - TOLSTOI FORMATION
- CRETACEOUS
  - CHIONIK FORMATION

SOURCE ROCK QUALITY

TOTAL ORGANIC CARBON % — CUTTINGS / SWC — POOR 0.5 / MODERATE 1.5 / GOOD 3.0

VISUAL KEROGEN — INERT / GAS PRONE / OIL PRONE — D / C / B / A

PYROLYSIS DATA

SOURCE TYPE — GOGI RATIO — OIL 0.2 / MIXED OIL/GAS / GAS 0.5

ROCK - EVAL — MAX YIELD kg/t — P_1 / P_2 — 1.5 5 10 15

PRODUCTS — OIL YIELD kg/t — 5 10 15 — GAS YIELD kg/t — 5 10 15

SS COAL
COAL 21
COAL 21
COAL 15-5
48 COAL
COAL 20-5
SS COAL
31-5 COAL
SILT/COAL

COMMENTS

BETWEEN 1500' - 2210' P_2 = 0

SILTSTONES BETWEEN 12160' - 13460' P_2 < 0.2 KG/tonne

NOTES
- ● Average Generation Threshold for Oil Prone Kerogens.
- TSE - Total Soluble Extract.
- TOC - Total Organic Carbon.
- SAC - Saturates Content.

NOTES
1. GOGI = Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-Eval). P_2 = Pyrolysed Hydrocarbon Yield from 250-550°C (Oil plus Gas), (Rock-Eval).
2. Source Rock Potential Ratings for PGC and Rock Eval (P_2 only) Yields are :- < 0.5, very lo : 1-5, Poor : 5-5, Moderate : 5-10, Good : 10-15, Very Good.
3. Values represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons actually reaching the sea/air may be only 1% of this Value.
4. Samples with Oil Yields of < 1.5 kg/tonne or TOC'S of < 0.5 % are unlikely to generate sufficient Oil to commence migration.

WELL: DAVID - RIVER - 1A

LOCATION: BRISTOL BAY, ALASKA.

OPERATOR: PAN AMERICAN.

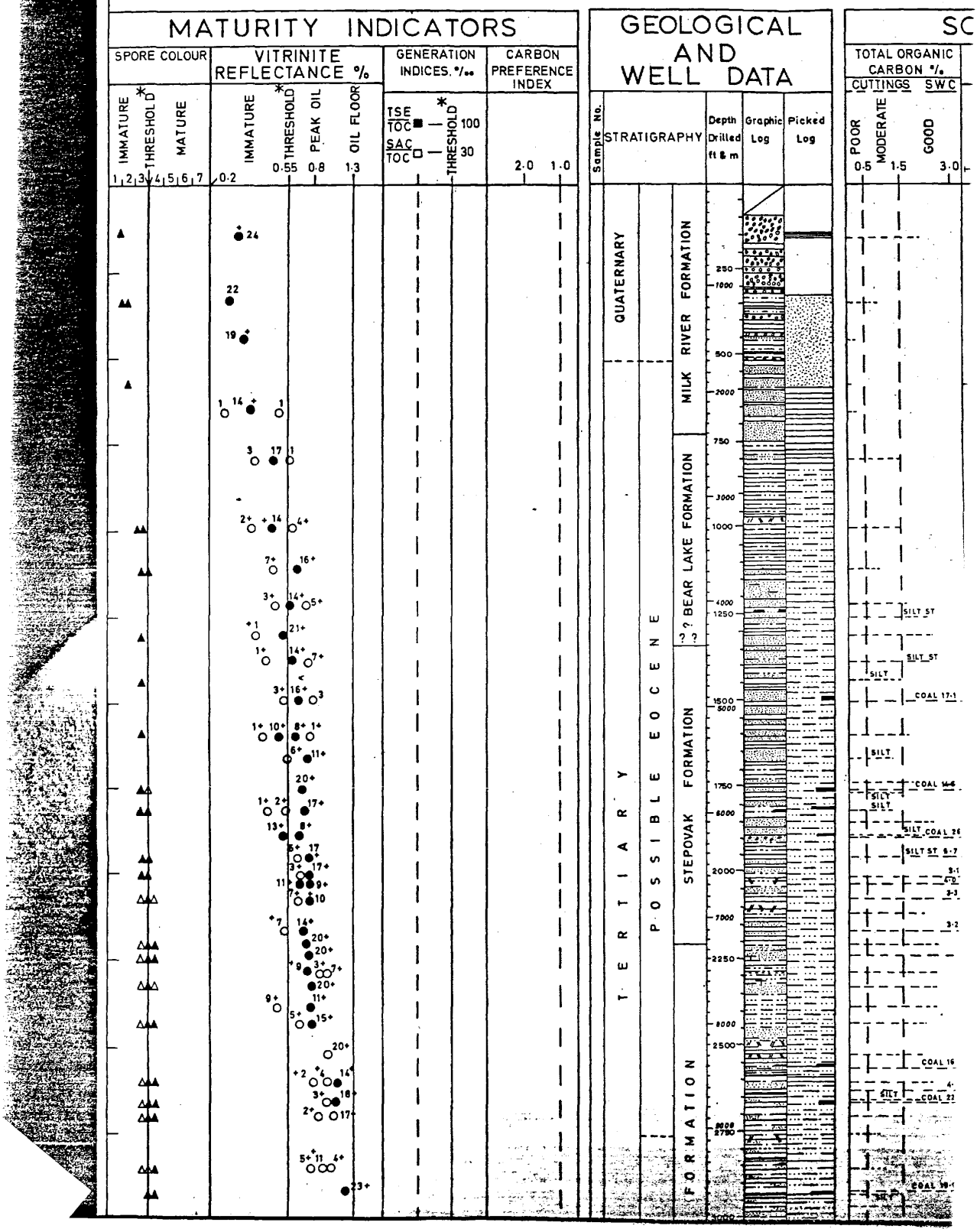
Date Spudded: 11/6/68

Date Completed: 31/6/69

TD: 13769 ft

BP RESEAR

PETR

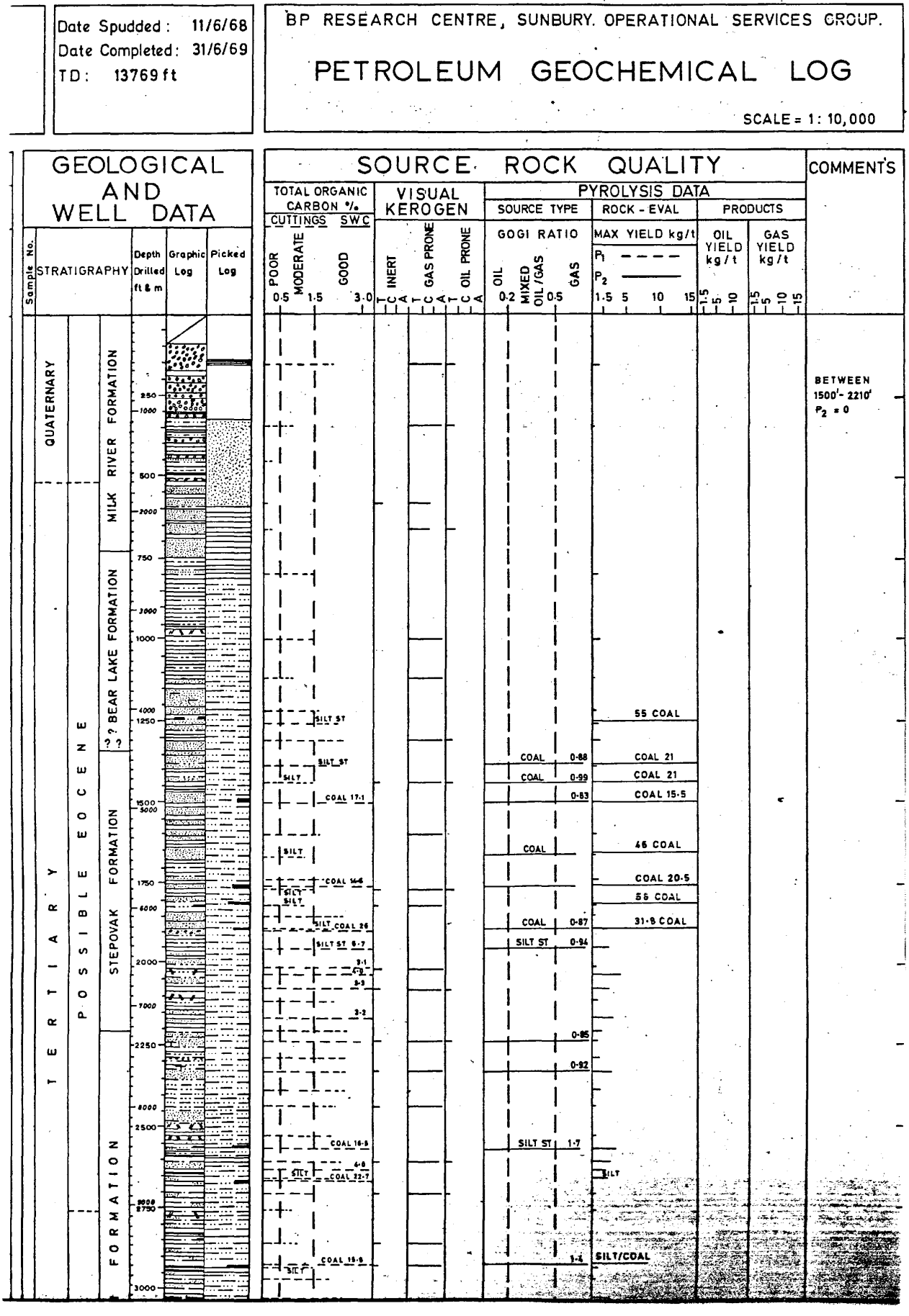


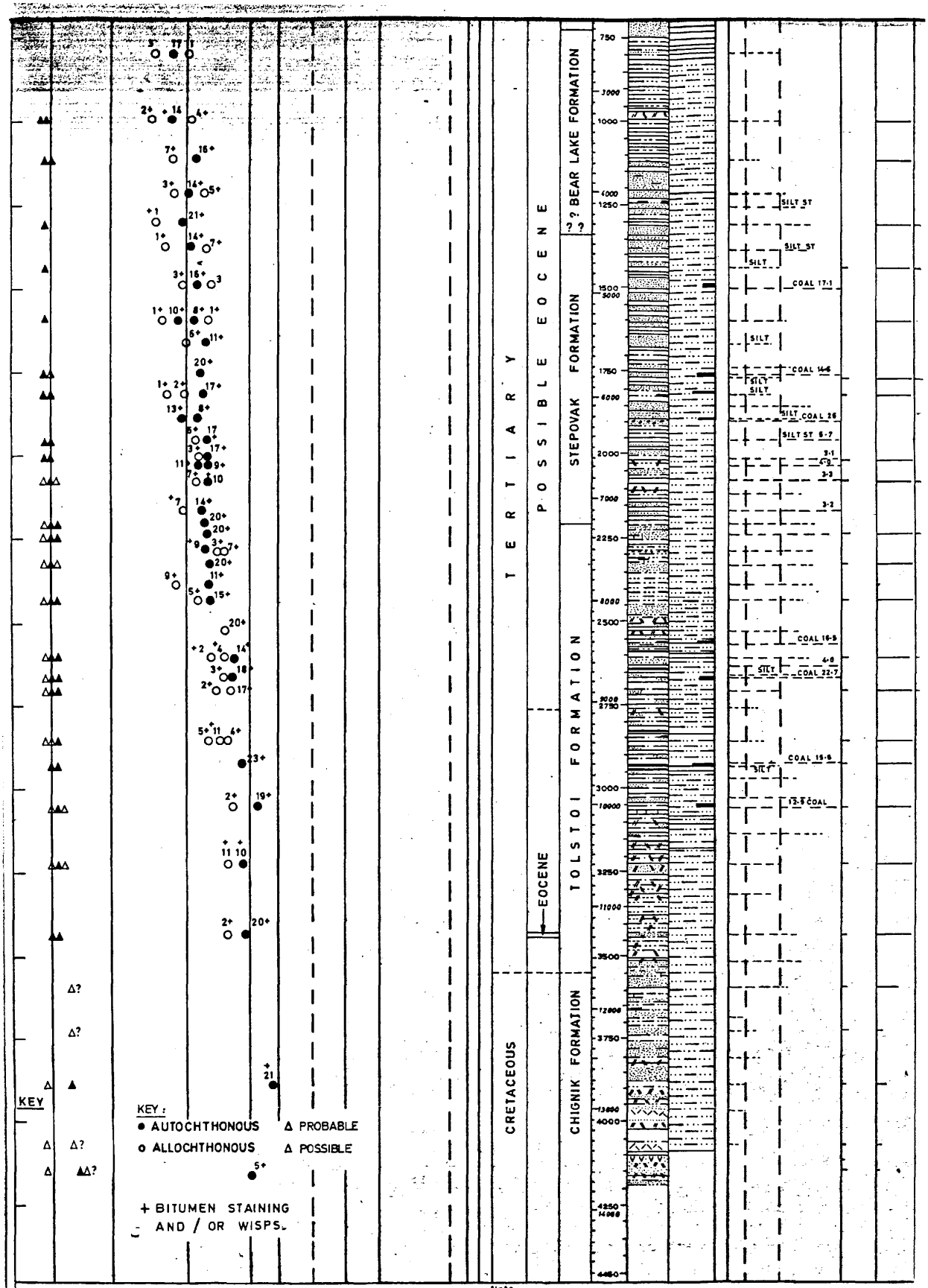
Date Spudded: 11/6/68
Date Completed: 31/6/69
TD: 13769 ft

BP RESEARCH CENTRE, SUNBURY. OPERATIONAL SERVICES GROUP.

PETROLEUM GEOCHEMICAL LOG

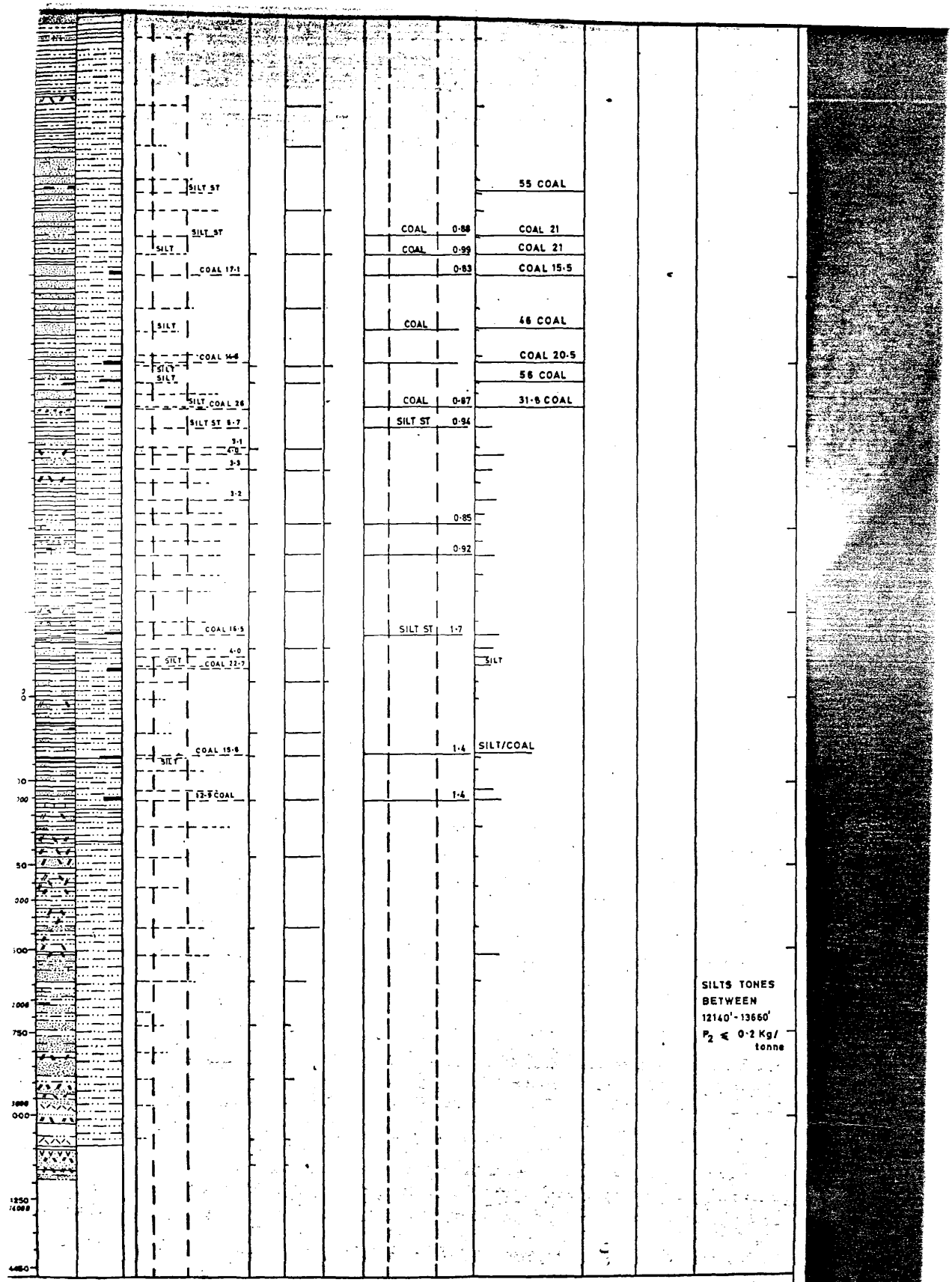
SCALE = 1: 10,000





NOTES
* Average Generation Threshold for Oil Prone Kerogens.
TSE - Total Soluble Extract.
TOC - Total Organic Carbon.
SAC - Saturates Content.

Note
1. GOGI = Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-E
2. Source Rock Potential Ratings for PGC and Rock Eval (P_2 only) Yields are :-<
3. Values represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons
4. Samples with Oil Yields of <1.5 kg/tonne or TOC'S of < 0.5 % are unlikely to



neration Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-Eval). P_2 = Pyrolysed Hydrocarbon Yield from 250-550°C (Oil plus Gas), (Rock-Eval).
ntial Ratings for PGC and Rock Eval (P_2 only) Yields are :-< 0.5, Insig: < 1.5, Poor :> 1.5-5, Moderate :> 5-15, Good : > 15, Very Good.
Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons actually reaching the reservoir may be only 1 % of this Value.
Yields of < 1.5 kg/tonne or TOC'S of < 0.5 % are unlikely to generate sufficient Oil to commence migration.

TABLE 1

VITRINITE REFLECTANCE DATA

WELL: HOODOO LAKE UNIT 2
LOCATION: BRISTOL BAY,ALASKA

DEPTH (ft)	REFLECTANCE VALUES(%Ro)	COMMENTS
780	.24(8)	BAR/F BW+VW+VPAR/ONE LGN CTG - NO FL
1800	.37(5),.53(4)	OCC BW/TR PHYT/F PAR V+I - NO FL
2160	.52(5),.68(6)	LIGHT BS+W/TR PHYT/F VW/OX - LT O
2520	.42(6),.63(2)	BAR/OCC BW/F COR V SP - NO FL
2910	.5(2),.77(5)	BW/TR VPAR+W-VAR - NO FL
3300	.42(1),.8(4)	BAR/BW/F COR VW+PAR-VAR - DO
3660	.5(1),.73(5)	BAR/OCC BW/F VPAR-VAR - NO FL
4020	.55(2),.74(5)	BAR/BW/F VW+PAR - NO FL
4400	.54(1),.71(11)	BW+LIGHT BS/TR VPAR+WPAR - M-DO
4780	.74(12)	BW+LIGHT-MOD S/F IPAR=VW - NO FL
5280	.8(21)	LIGHT-MOD BS+W/F VPAR+W/L PHYT - NO FL
5520	.88(22)	LIGHT-MOD BS/VW+PAR/L PHYT
5800	.94(23)	LIGHT BS+W/F VW+PAR/L PHYT - NO FL
6000	1.07(23)	STR OBS/PL LARGE VST+PAR/MOD PHYT
6200	1.12(21)	STR BS/LARGE VW+PAR/F COAL FR/MOD PHYT
6400	1.27(23)	MOD-STR OBS/LARGE VST+PAR/COAL FR
6600	1.12(22)	STR BS/VST+PAR/COAL CTGS/MOD PHYT
6760	1.4(22)	STR BS/LARGE VST+PAR/F COAL FR/MOD PHYT - NO FL
7100	1.37(22)	STR OBS/VPAR+W/L-MOD PHYT
7540	1.36(23)	VAR BS/VST+W+PAR/L-MOD PHYT - NO FL
7980	1.78(5)	BAR/TR B/F VPAR
8050	2.14(23)	STR BS/PL COAL FR
8250	2.19(21)	VAR BS/VST+W+PAR/MOD-RICH PHYT - NO FL
8500	2.15(20)	MOD BS+W/F V+IPAR+WPAR/L PHYT
8950	2.37(4)	BAR/VAR BS/F ORGANIC SP - NO FL
9450	1.74(2)	BAR/OCC MOD BS/F INST B AREAS - NO FL
9700	2.31(12)	MOD BS+W/TR HIGH RO PAR - NO FL
9900	2.05(21)	MOD BS/TR VPAR+LOOSE FR/L B - NO FL
10700	2.23(1)	BAR/OCC BW/F PHYT SP - NO FL
11010	2.39(9)	VAR MOD BS/TR HIGH RO PHYT - NO FL

FIGURES IN PARENTHESES INDICATE NUMBER OF READINGS
SEE LIST OF ABBREVIATIONS OVERLEAF

TABLE 1A

VITRINITE TABLE ABBREVIATIONS

ANS - ANISOTROPIC
BS - BITUMEN STAINING
BAR - VIRTUALLY BARREN
CARB - CARBARGILITE
CTGS - CUTTINGS
DMA - DRILLING MUD ADDITIVE
F - FEW
FR - FRAGMENTS
GN - GNARLED
I - INERTINITE
IGN - IGNEOUS TRACES
L - LOW ORGANIC CONTENT
LOW - LOWEST REFLECTANCES MEASURED
MOD - MODERATE ORGANIC CONTENT
NTV - NO TRUE VITRINITE
OCC - OCCASIONAL
P - POOR
PL - PLENTIFUL-PLENTY
R - REWORKED
RO - REFLECTANCE MEASUREMENT
RICH - RICH-HIGH ORGANIC CONTENT
SC - SCRUFFY
SLT - SILTSTONE
SP - SPECKS
STC - STRUCTURE
TB - TURBO-DRILLED
TEL - TELINITIC
VL - V.LOW ORGANIC CONTENT
VAR - VARIABLE (HIGH) RO
W - WISPS-WISPY
* - ALLOCTHONOUS
? - QUESTIONABLE
BL - BLEBS

B - BITUMEN
BW - BITUMEN WISPS
CAV - CAVED
COR - CORRODED
DD - DIFFERENTIATION DIFFICULT
DOM - DOMINANT
FL - FLUORESCENCE
G - GOOD
GRAN - GRANULARITY
INST - INTERSTITIAL
IRON - IRON OXIDES
LGN - LIGNITE
M - MOSTLY
NDP - NO DETERMINATION POSSIBLE
OBS - OVERALL BITUMEN STAINING
OX - INDICATIONS OF OXIDATION
PAR - PARTICLES
POS - POSSIBLY
RM - REWORKED MATERIAL
RES - RESIN
S - SOME
SH - SHALE
SML - SMALL
SUB - SUBORDINATE
STR - STRONGLY
TR - TRACE
V - VITRINITE
VW - VITRINITE WISPS
VST - VITRINITE STRINGERS
WH - WHOLLY
= - EQUAL PROPORTIONS

PHY - PHYTOCLASTS (CONTENT)

(SPORE FLUORESCENCE COLOURS UNDER U.V. LIGHT)

G - GREEN
O - ORANGE
LT - LIGHT
D - DEEP

Y - YELLOW
R - RED
M - MID
P - PALE

TABLE 2

VISUAL KEROGEN DESCRIPTIONS

WELL: HOODOO LAKE UNIT 2
LOCATION: BRISTOL BAY,ALASKA

DEPTH(ft)	SPORE COLOUR	ESTIMATED SOURCE POTENTIAL
780	2	POOR GAS
1800	2/3	NONE-POOR GAS
2160	3	POOR-?MOD GAS
2520	3	POOR-?MOD GAS
3300	3	NONE-POOR GAS
3660	3-3/4	POOR GAS
4020	3-3/4	POOR GAS
4780	3-3/4	POOR GAS
5280	3-3/4	POOR GAS
5800	3-3/4	GOOD GAS/SUB OIL ?
6100	3-3/4	GOOD GAS/SUB OIL ?
6300	3-3/4	GOOD GAS/SUB OIL ?
6500	3-3/4	GOOD GAS/SUB OIL ?
6600	3-3/4	GOOD GAS/SUB OIL ?
6960	3-3/4	GOOD GAS/SUB OIL ?
7100	3-3/4	GOOD GAS/SUB OIL ?
7240	3/4-4	GOOD GAS/SUB OIL ?
8050	4-4/5	GOOD GAS
8250	4/5-5	GOOD GAS
8500	4/5-5	MOD GAS
8930	5	POOR GAS
9700	5	MOD GAS
9900	5	GOOD GAS
10700	5/6-6	NONE-POOR GAS

TABLE 3

ROCK-EVAL AND PYROLYSIS DATA

WELL: HOODOO LAKE UNIT 2
LOCATION: BRISTOL BAY,ALASKA

DEPTH (ft)	P1 KG/TONNE	P2 KG/TONNE	GOGI	TOC (%wt)	HYDROGEN INDEX
780	0	0			
1410	0	.2			
1800	0	0			
2160	0	.1			
2520	0	.1			
2910	0	.1			
3300	0	0			
3660	0	0			
4020	0	0			
4400	0	0			
4780	0	0			
5280	0	0			
5520	0	0			
5800	0	0			
5900	.1	1.6	1.21		
6000	.1	1.8	1.03		
6100	.3	3.9	1		
6200	.1	3.8	1.09		
6300	.3	3.5	1.16		
6400	.1	3.1	1.07		
6500	.6	8.2	.93		
6600	.6	5.2	1.04		
6760	1	14.4	1.01		
6960	.6	4.3	1.36		
7100	.2	2.7	.89		
7360	1.4	11.9	1.07		
7540	0	.5			
7620	.1	.5			
7980	0	0			
8050	0	0			
8150	0	0			
8250	0	0			
8500	0	0			
8950	0	0			
9450	0	0			
9700	0	0			
9900	0	0			
10700	0	0			
11010	0	0			

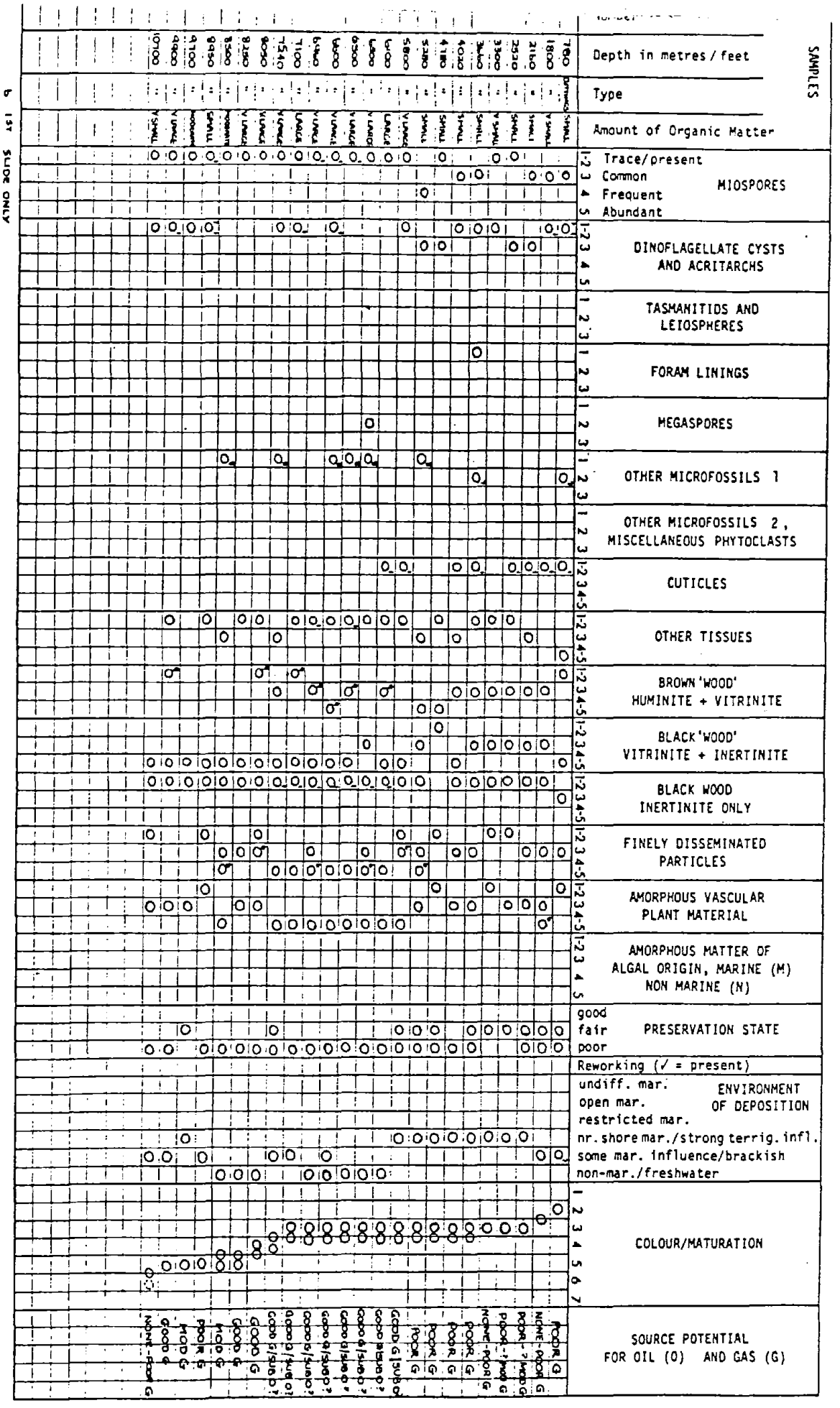
TABLE 4

LITHOLOGY AND TOC DATA

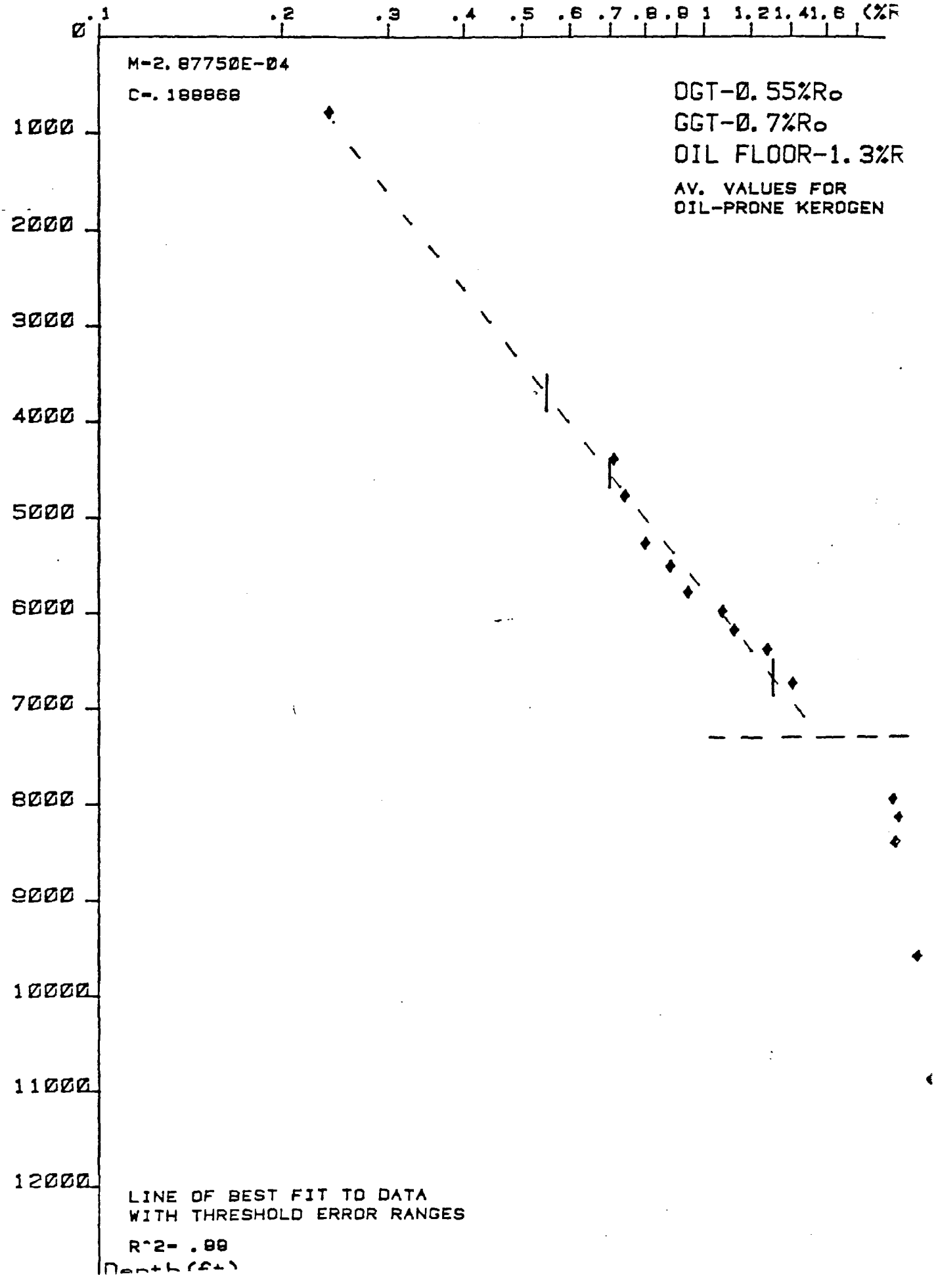
WELL: HOODOO LAKE UNIT 2
LOCATION: BRISTOL BAY,ALASKA

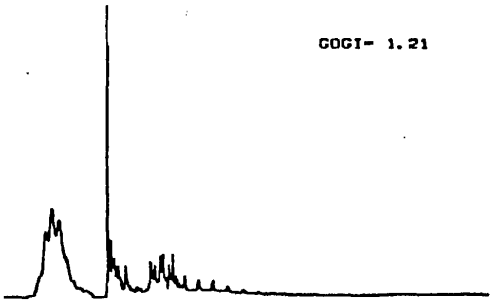
DEPTH(ft)	AGE/FM	PICKED LITHOLOGY	%TOC	%CARBONATE
780	TERT/BEAR LAKE	C-CLAY	n.d.	n.d.
1410	TERT/BEAR LAKE	C-CLAY	n.d.	n.d.
1800	TERT/BEAR LAKE	C-CLAY	n.d.	n.d.
2160	TERT/BEAR LAKE	C-SILTSTONE	n.d.	n.d.
2520	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
2910	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
3300	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
3660	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
4020	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
4400	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
4780	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
5280	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
5520	TERT/STEPOVAK	C-SILTSTONE	n.d.	n.d.
5800	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
5900	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6000	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6100	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6200	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6300	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6400	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6500	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6600	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
6760	TERT/TOLSTOI	C-COALY SLTST	n.d.	n.d.
6960	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
7100	TERT/TOLSTOI	C-SILTSTONE	n.d.	n.d.
7360	CRET/CHIGNIK	C-COALY SLTST	n.d.	n.d.
7540	CRET/CHIGNIK	C-SILTSTONE	n.d.	n.d.
7620	CRET/CHIGNIK	C-SILTSTONE	n.d.	n.d.
7980	CRET/CHIGNIK	C-CALC SLTST	n.d.	n.d.
8050	CRET/CHIGNIK	C-SILTSTONE	n.d.	n.d.
8150	CRET/CHIGNIK	C-SILTSTONE	n.d.	n.d.
8250	CRET/CHIGNIK	C-SILTSTONE	n.d.	n.d.
8500	CRET/CHIGNIK	C-SILTSTONE	n.d.	n.d.
8950	CRET/HERENDEEN	C-LIMESTONE	n.d.	n.d.
9450	CRET/HERENDEEN	C-LIMESTONE	n.d.	n.d.
9700	JURASSIC	C-CALC SLTST	n.d.	n.d.
9900	JURASSIC	C-CALC SLTST	n.d.	n.d.
10700	JURASSIC	C-CALC SLTST	n.d.	n.d.
11010	JURASSIC	C-SILTSTONE	n.d.	n.d.

SAMPLE TYPES :-
N-CORE SAMPLE
S-SIDEWALL CORE
O-OUTCROP
C-CUTTINGS

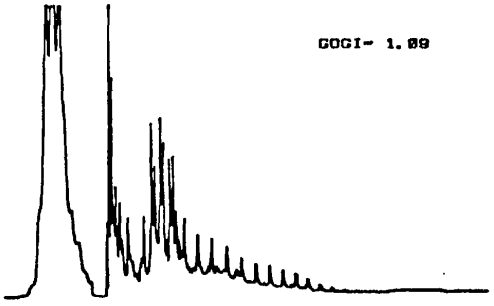

SAMPLES
Depth in metres / feet
Type
Amount of Organic Matter
Trace/present
Common
Frequent
Abundant
MIOSPORES
DINOFLAGELLATE CYSTS AND ACRITARCHS
TASMANITIDS AND LEIOSPHERES
FORAM LININGS
MEGASPORES
OTHER MICROFOSSILS 1
OTHER MICROFOSSILS 2, MISCELLANEOUS PHYTOCLASTS
CUTICLES
OTHER TISSUES
BROWN 'WOOD' HUMINITE + VITRINITE
BLACK 'WOOD' VITRINITE + INERTINITE
BLACK WOOD INERTINITE ONLY
FINELY DISSEMINATED PARTICLES
AMORPHOUS VASCULAR PLANT MATERIAL
AMORPHOUS MATTER OF ALGAL ORIGIN, MARINE (M) NON MARINE (N)
good
fair
poor
PRESERVATION STATE
Reworking (✓ = present)
undiff. mar.
open mar.
restricted mar.
nr. shore mar./strong terrig. infl.
some mar. influence/brackish
non-mar./freshwater
ENVIRONMENT OF DEPOSITION
COLOUR/MATURATION
SOURCE POTENTIAL FOR OIL (O) AND GAS (G)
6 1ST SLIDE ONLY
7 BLACK NETS
8 FUNGAL REMAINS
9 OXIDATION PRODUCTS

Vitrinite Reflectance Analysis
for well: HOODOO LAKE UNIT 2

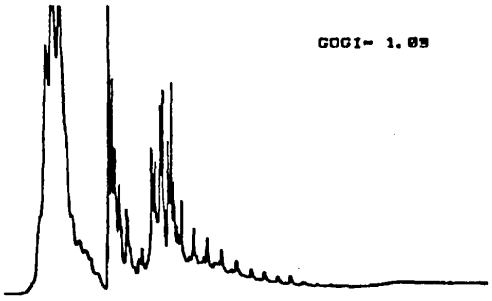




SAMPLE: 5840-5900 FT

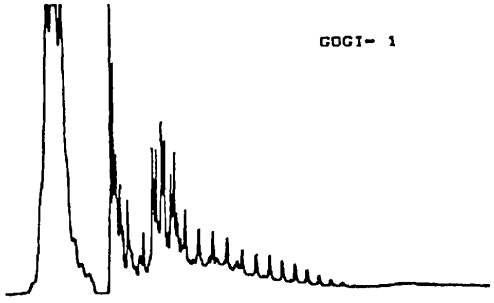


SAMPLE: 6140-6200 FT

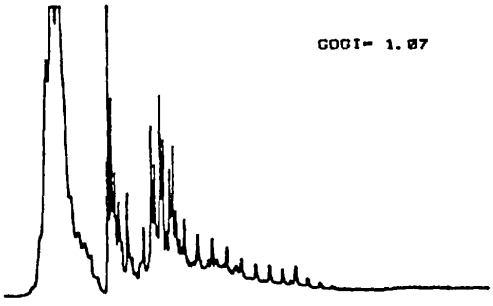


SAMPLE: 5940-6000 FT

SAMPLE: 6240-6300 FT



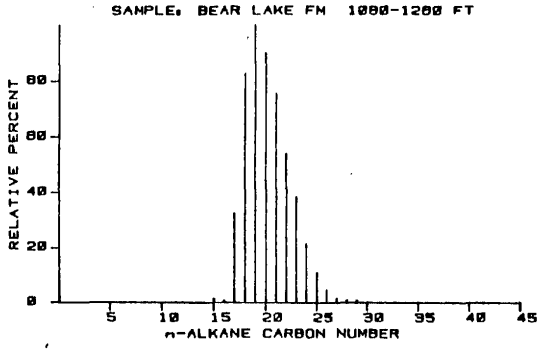
SAMPLE: 6040-6100 FT

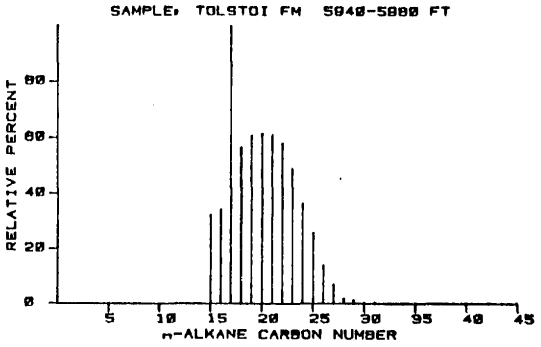


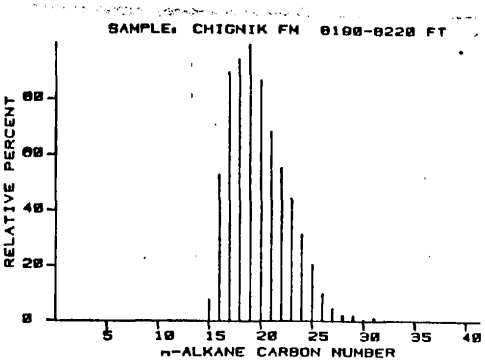
SAMPLE: 6340-6400 FT

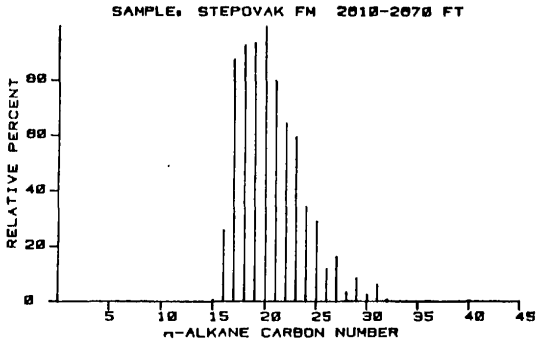
GEOCHEMISTRY BRANCH, BP SUNB
OPERATIONS & DEVELOPMENT GR

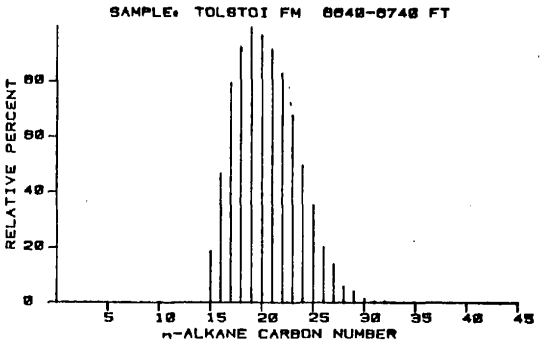
KEROGEN PYROLYSATES (P2)

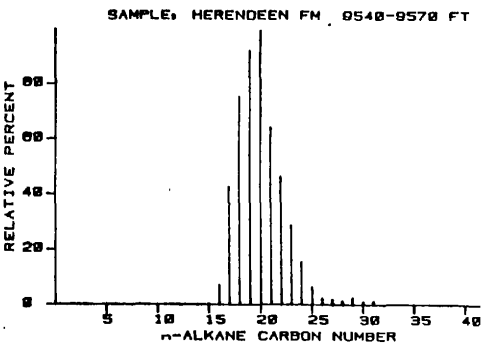


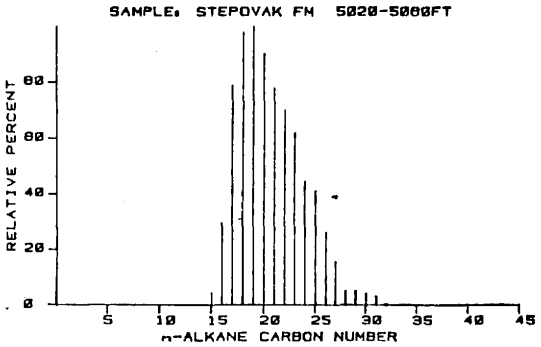


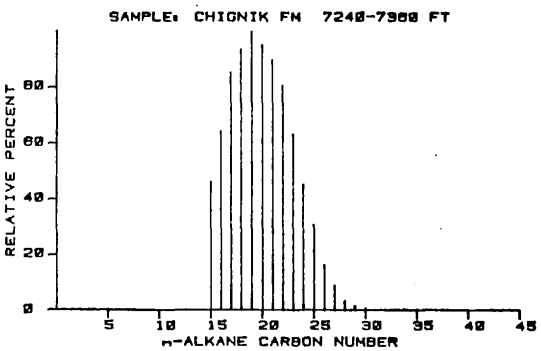






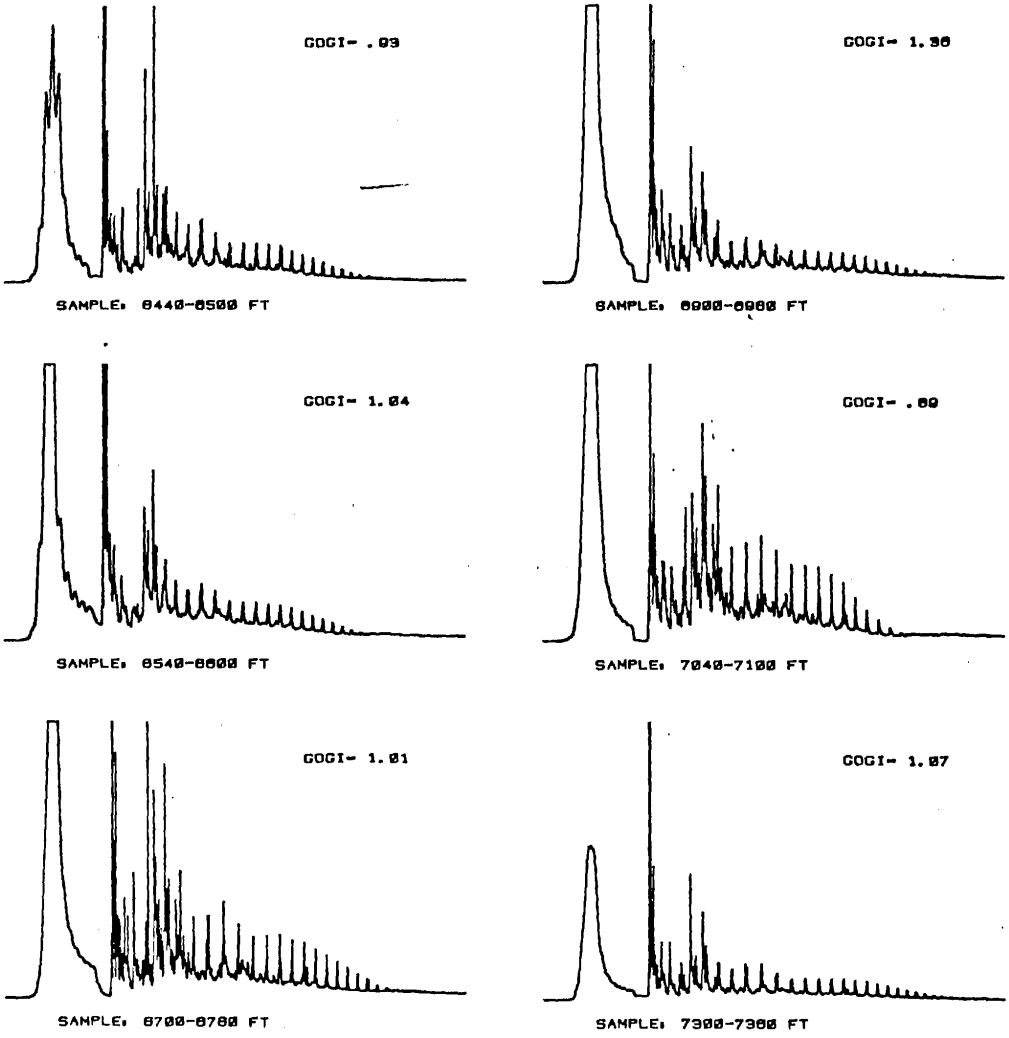






GEOCHEMISTRY BRANCH, BP SUNBUR
OPERATIONS & DEVELOPMENT GROU

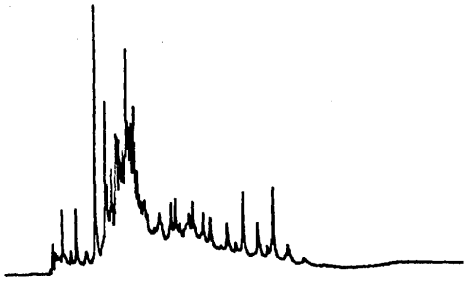
NORMALISED n-ALKANE DISTRIBUTIO



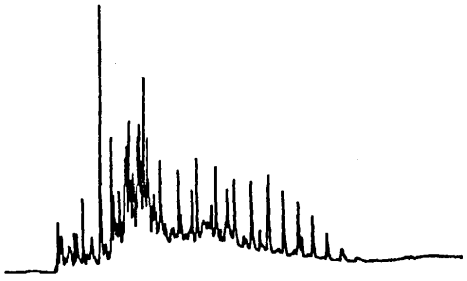
GEOCHEMISTRY BRANCH, B
OPERATIONS & DEVELOPM

KEROGEN PYROLYSATE

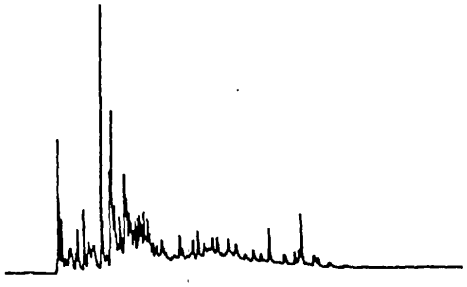
FIG.4



SAMPLE: 8540-8600 FT



SAMPLE: 6900-6960 FT



SAMPLE: 7300-7360 FT

GEOCHEMISTRY BRANCH, BP SUN
OPERATIONS & DEVELOPMENT GF

THERMAL VOLATILATES (P1)

WELL: HOODOO LAKE UNIT #2
LOCATION: BRISTOL BAY, ALASKA.
OPERATOR: SOCAL

Date Spudded: 13-2-70
Date Completed: 21-4-70
TD: 11,243 ft

BP RESEARCH CENTRE, SUNBURY. OPERATIONAL SERVICES GROUP.

PETROLEUM GEOCHEMICAL LOG

SCALE = 1: 10,000

MATURITY INDICATORS

SPORE COLOUR: IMMATURE | * THRESHOLD | MATURE (1, 2, 3, 4, 5, 6, 7)

VITRINITE REFLECTANCE %: IMMATURE | * THRESHOLD 0.55 | PEAK OIL 0.8 | OIL FLOOR 1.3 (0.2)

GENERATION INDICES ‰: TSE / TOC ■ — 100; SAC / TOC □ — * THRESHOLD 30

CARBON PREFERENCE INDEX: 2.0 | 1.0

GEOLOGICAL AND WELL DATA

Sample No. | STRATIGRAPHY | Depth Drilled ft & m | Graphic Log | Picked Log

- QUAT.
- TERTIARY
  - STEPOVAK FM
    - 1st BEAR LAKE FM
  - TOLSTOI FM
- CRETACEOUS
  - CHIGNIK FM (COAL VALLEY MBR)
  - HERENDEEN FM
- ? U. JURASSIC
  - NAKNEK FM. OR STAHIUKOVICH FM

SOURCE ROCK QUALITY

TOTAL ORGANIC CARBON %: CUTTINGS | SWC — POOR 0.5 | MODERATE 1.5 | GOOD 3.0

VISUAL KEROGEN: INERT | GAS PRONE | OIL PRONE

PYROLYSIS DATA

SOURCE TYPE: GOGI RATIO — OIL 0.2 | MIXED OIL/GAS | GAS 0.5

ROCK - EVAL: MAX YIELD kg/t — P_1 ----- P_2 ——— (1.5, 5, 10, 15)

PRODUCTS: OIL YIELD kg/t (1.5, 5, 10, 15) | GAS YIELD kg/t (5, 15, 10, 15)

COMMENTS

P1 = 0
P2 ≤ 0.2

P1 = 0
P2 = 0

KEY

- ▲ PROBABLE
- △ POSSIBLE
- ● AUTOCHTHONOUS
- ○ ALLOCHTHONOUS
- + BITUMEN STAINING AND / OR WISPS.

NOTES

* Average Generation Threshold for Oil Prone Kerogens.
TSE - Total Soluble Extract.
TOC - Total Organic Carbon.
SAC - Saturates Content

Note

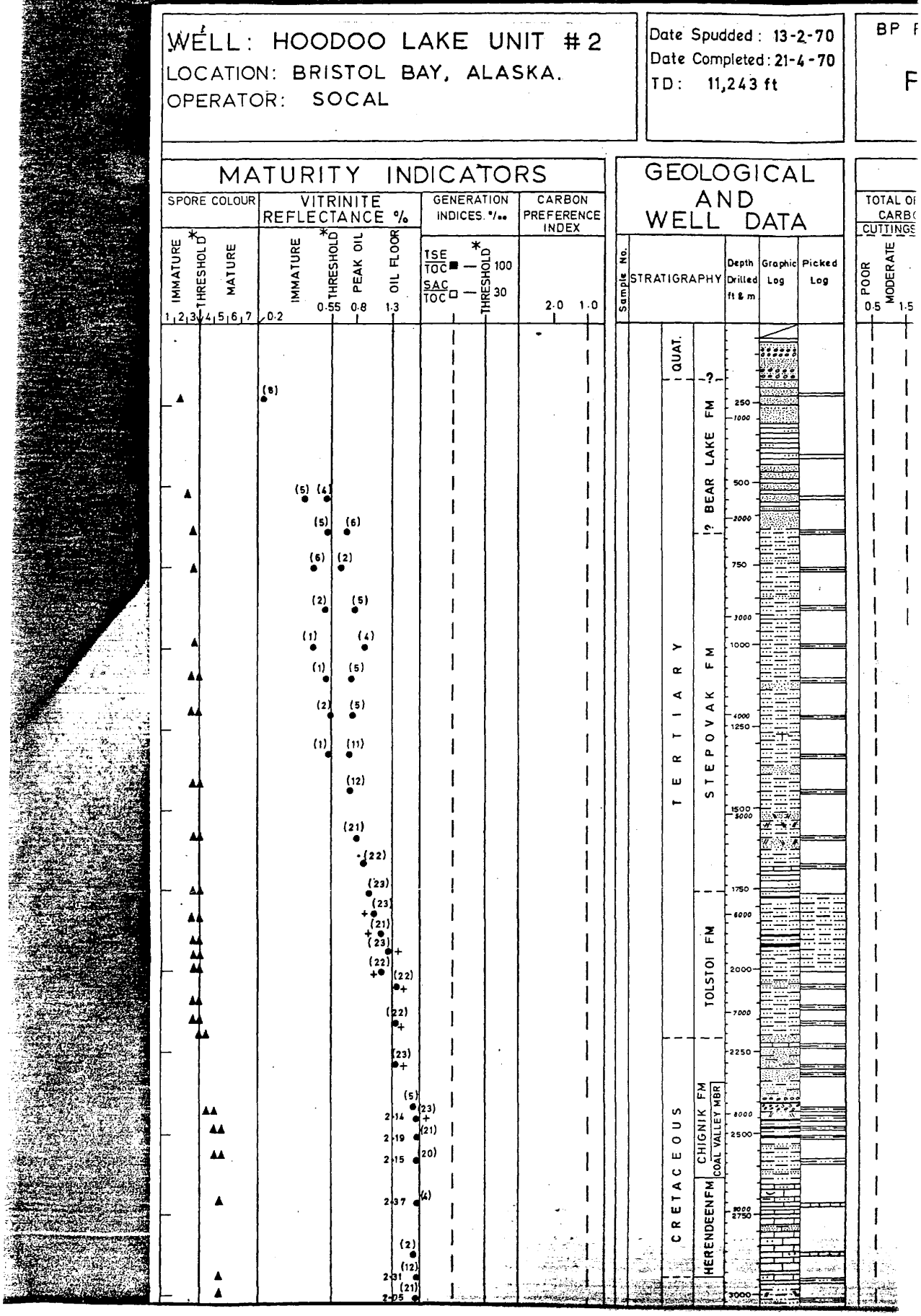
1. GOGI = Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-Eval). P_2 = Pyrolysed Hydrocarbon Yield from 250-550°C (Oil plus Gas), (Rock-Eval).
2. Source Rock Potential Ratings for POC and Rock Eval (P_2 only) Yields are :- < 0.5, Insig: < 1.5, Poor :- 1.5-5, Moderate :- 5-15, Good :- > 15, Very Good.
3. Values represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons actually reaching the reservoir may be only 1% of this Value.
4. Samples with Oil Yields of < 1.5 kg/tonne or TOC'S of < 0.5% are unlikely to generate sufficient Oil to commence migration.

WELL: HOODOO LAKE UNIT #2
LOCATION: BRISTOL BAY, ALASKA.
OPERATOR: SOCAL

Date Spudded: 13-2-70
Date Completed: 21-4-70
TD: 11,243 ft

BP F

F

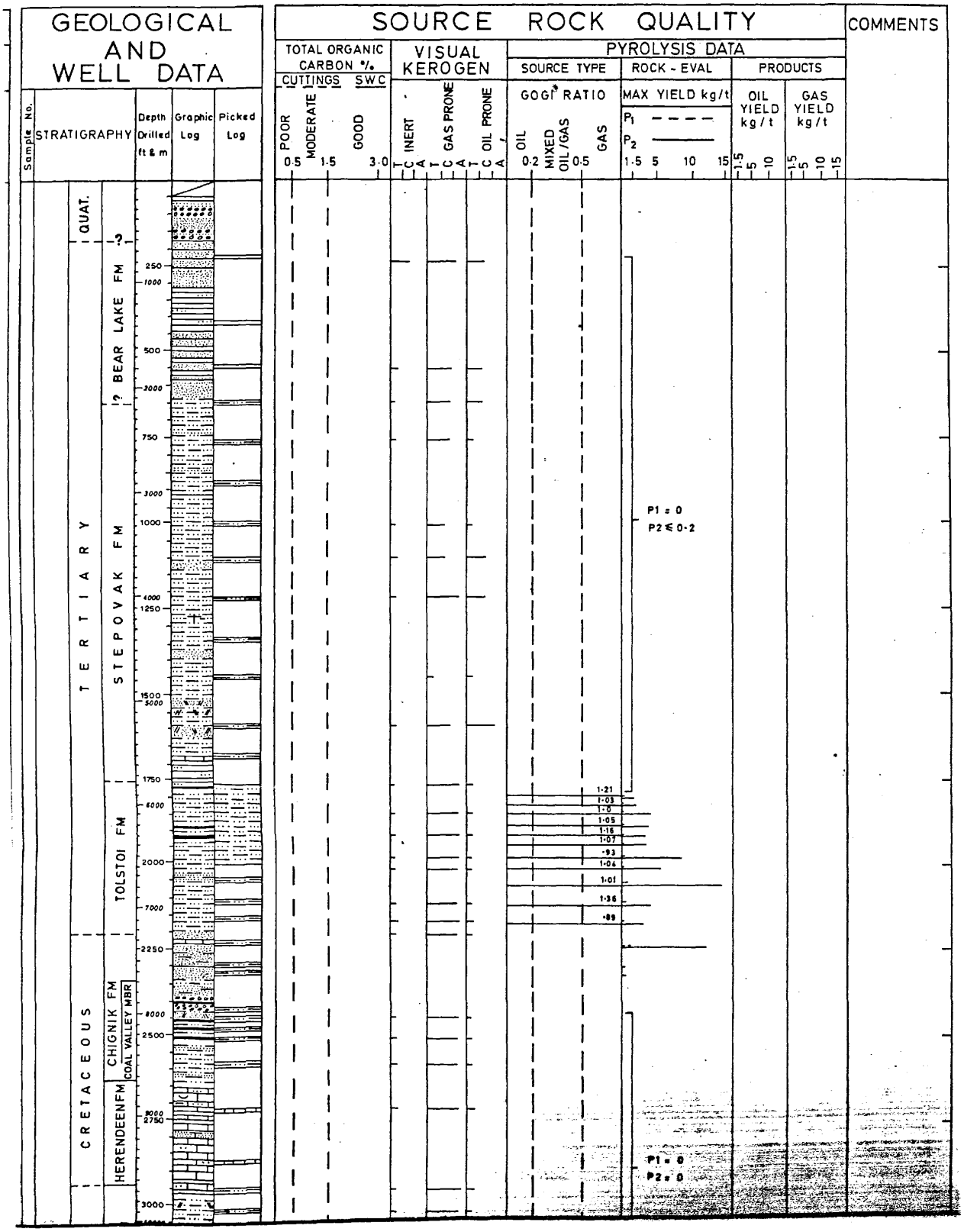


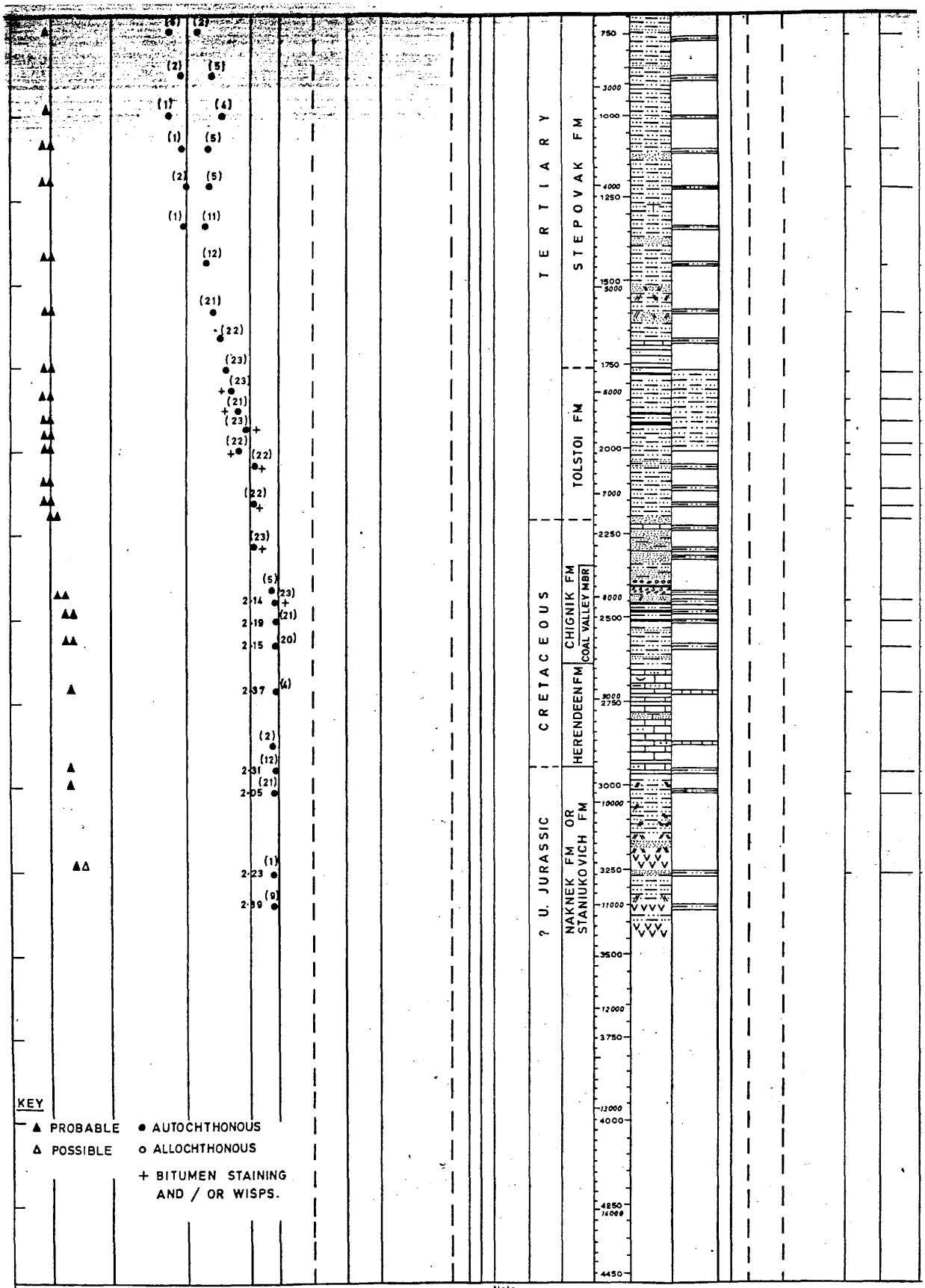
Date Spudded : 13-2-70
Date Completed : 21-4-70
TD : 11,243 ft

BP RESEARCH CENTRE, SUNBURY. OPERATIONAL SERVICES GROUP.

PETROLEUM GEOCHEMICAL LOG

SCALE = 1 : 10,000



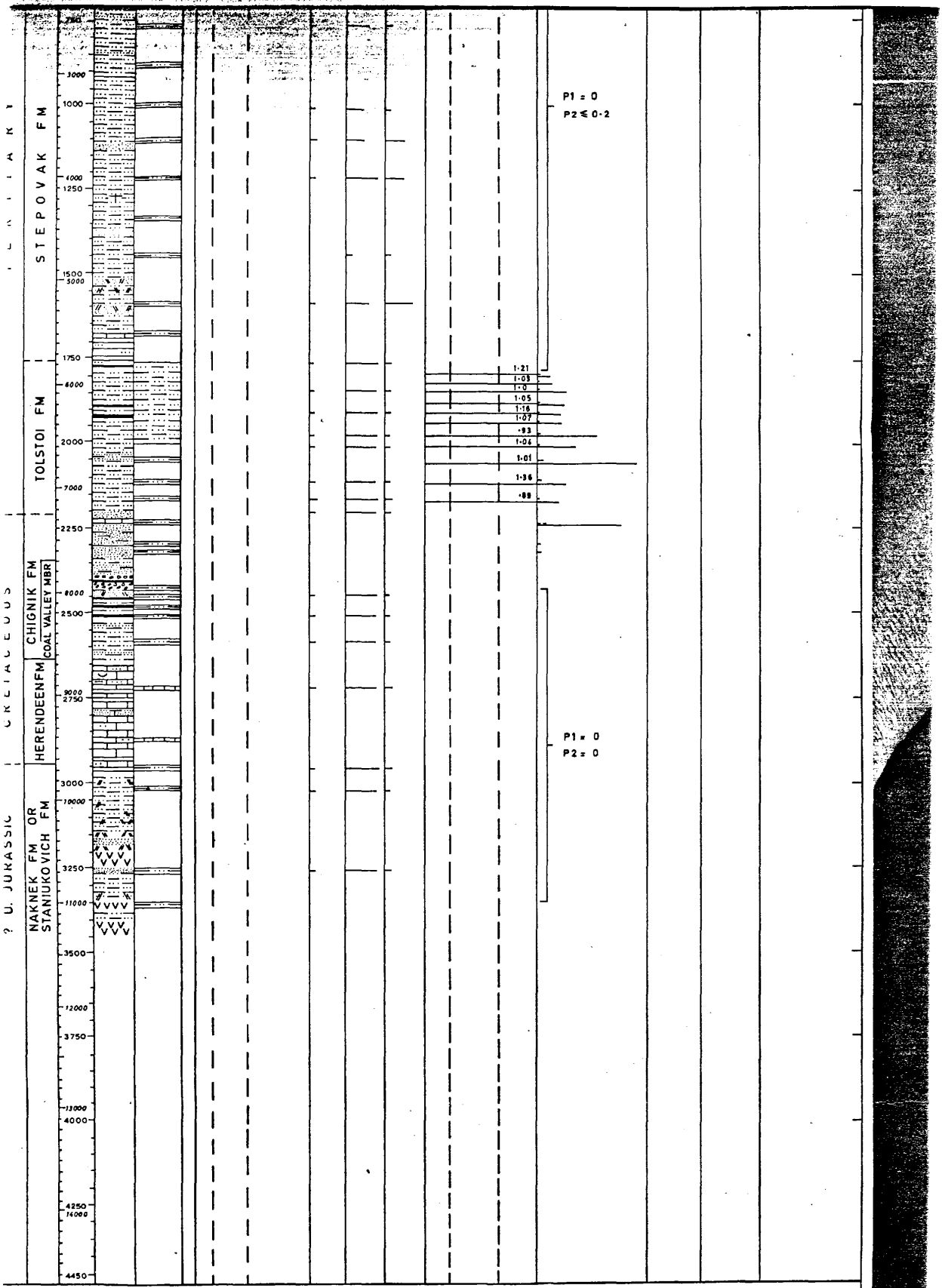


NOTES

* Average Generation Threshold for Oil Prone Kerogens.
TSE - Total Soluble Extract.
TOC - Total Organic Carbon.
SAC - Saturates Content.

Note

1. GOGI = Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-E
2. Source Rock Potential Ratings for PGC and Rock Eval (P_2 only) Yields are :-<C
3. Values represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons
4. Samples with Oil Yields of <1.5 kg/tonne or TOC'S of <0.5 % are unlikely to



= Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-Eval). P_2 = Pyrolysed Hydrocarbon Yield from 250-550°C (Oil plus Gas), (Rock-Eval).
s Rock Potential Ratings for PGC and Rock Eval (P_2 only) Yields are :-< 0.5, Insig: < 1.5, Poor :> 1.5-5, Moderate :> 5-15, Good : > 15, Very Good.
s represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons actually reaching the reservoir may be only 1 % of this Value.
les with Oil Yields of < 1.5 kg/tonne or TOC'S of < 0.5 % are unlikely to generate sufficient Oil to commence migration.

TABLE 1

VITRINITE REFLECTANCE DATA

WELL: SANDY RIVER-1
LOCATION: BRISTOL BAY, ALASKA

DEPTH (FT)	REFLECTANCE VALUES(%RO)	COMMENTS
2820	.43(20)	F COAL CTGS /S BS - NO FL
3420	0(0)	NDP
3630	.24(3)	BAR - Y/O(SPORES+HC SP)
4290	.27(20)	LT BS+BW/VW+W PAR - Y/O+LTO
4860	.3(21)	PL COAL CTGS V/VAR RO - FL HC SP
5100	.37(21)	FULL RANGE MACERALS - Y/O
5320	.31(22)	COAL V - Y/O
5710	.3(20)	V - Y+Y/O(SPORES+HC SP)
6010	.32(22)	V - Y/O
6310	.29(20)	LIGNITE/F DIRTY CTGS - Y/O
6520	.32(23)	COAL FULL RANGE MACERALS - Y+Y/O
6760	.31(23)	M LIGNITE V/VAR RO - Y/O
7150	.33(22)	BW/L PHY/VW+W PAR - LTO
7600	2.04(3)	BAR F SP HIGH RO - NO FL
9075	.35(22)	LIGNITE V/SH VW BS - Y/O
9270	.37(21)	V - Y/O+LTO
9645	.36(22)	MOD/BS+BW/VW PAR W+VST - LTO
9975	.39(22)	V - L/MO
10305	.57(21)	VAR RO - DULL LTO+MO
10515	.61(22)	LIG V/SH PL VW+VST - Y(RES) Y/O (SPORES)
10755	.65(21)	V/SH BS VST - L+MO
11050	.62(22)	COAL V/SH BS+VST - MO
11300	.64(22)	VW+VST - LTO+MO
11550	.63(22)	VW+VST - LTO
12000	.67(21)	VW+VST - LTO+MO
12220	.66(20)	BW+BS/L/VW+W PAR/TR I PAR - LTO
12790	.66(20)	PL BW+BS/L/VW+W PAR/TR I PAR - MO
13050	.63(7) 1.17(6)	BW+BS/L/V PAR/VAR RO CTG TO CTG - LTO/MO

FIGURES IN PARENTHESES INDICATE NUMBER OF READINGS -
SEE LIST OF ABBREVIATIONS OVERLEAF

(P)RINT ANOTHER REPORT,(R)ETURN TO MAIN DATA ENTRY,
(A)SSIGN A NEW FILE OR (Q)UIT ?

TABLE 1A

VITRINITE TABLE ABBREVIATIONS

ANS - ANISOTROPIC
BS - BITUMEN STAINING
BAR - VIRTUALLY BARREN
CARB - CARBARGILITE
CTGS - CUTTINGS
DMA - DRILLING MUD ADDITIVE
F - FEW
FR - FRAGMENTS
GN - GNARLED
I - INERTINITE
IGN - IGNEOUS TRACES
L - LOW ORGANIC CONTENT
LOW - LOWEST REFLECTANCES MEASURED
MOD - MODERATE ORGANIC CONTENT
NTV - NO TRUE VITRINITE
OCC - OCCASIONAL
P - POOR
PL - PLENTIFUL-PLENTY
R - REWORKED
RO - REFLECTANCE MEASUREMENT
RICH - RICH-HIGH ORGANIC CONTENT
SC - SCRUFFY
SLT - SILTSTONE
SP - SPECKS
STC - STRUCTURE
TB - TURBO-DRILLED
TEL - TELINITIC
VL - V.LOW ORGANIC CONTENT
VAR - VARIABLE (HIGH) RO
W - WISPS-WISPY
* - ALLOCTHONOUS
? - QUESTIONABLE
BL - BLEBS

B - BITUMEN
BW - BITUMEN WISPS
CAV - CAVED
COR - CORRODED
DD - DIFFERENTIATION DIFFICULT
DOM - DOMINANT
FL - FLUORESCENCE
G - GOOD
GRAN - GRANULARITY
INST - INTERSTITIAL
IRON - IRON OXIDES
LGN - LIGNITE
M - MOSTLY
NDP - NO DETERMINATION POSSIBLE
OBS - OVERALL BITUMEN STAINING
OX - INDICATIONS OF OXIDATION
PAR - PARTICLES
POS - POSSIBLY
RM - REWORKED MATERIAL
RES - RESIN
S - SOME
SH - SHALE
SML - SMALL
SUB - SUBORDINATE
STR - STRONGLY
TR - TRACE
V - VITRINITE
VW - VITRINITE WISPS
VST - VITRINITE STRINGERS
WH - WHOLLY
= - EQUAL PROPORTIONS
PHY - PHYTOCLASTS (CONTENT)

(SPORE FLUORESCENCE COLOURS UNDER U.V. LIGHT)

G - GREEN
O - ORANGE
LT - LIGHT
D - DEEP

Y - YELLOW
R - RED
M - MID
P - PALE

TABLE 2

VISUAL KEROGEN DESCRIPTIONS

WELL: SANDY RIVER-1
LOCATION: BRISTOL BAY, ALASKA

DEPTH(ft)	SPORE COLOUR	ESTIMATED SOURCE POTENTIAL
3420	2	NONE
4290	2	POOR-?MOD GAS
5100	2	GOOD GAS
5320	2	GOOD GAS
5710	2	GOOD GAS
6010	2	GOOD GAS
6760	2	GOOD GAS
8150	2	GOOD GAS
9270	2	GOOD GAS
9510	2	GOOD GAS
9975	2-2/3	MOD GAS
10125	2/3	GOOD GAS
10305	2/3	GOOD GAS
10515	2/3	GOOD GAS
11050	2/3	GOOD GAS
11170	2/3	GOOD GAS
11300	2/3	GOOD GAS
11400	2/3	GOOD GAS
11820	2/3	GOOD GAS
12220	2/3	GOOD GAS
12410	2/3	GOOD GAS
12790	3	MOD-GOOD GAS

TABLE 2A

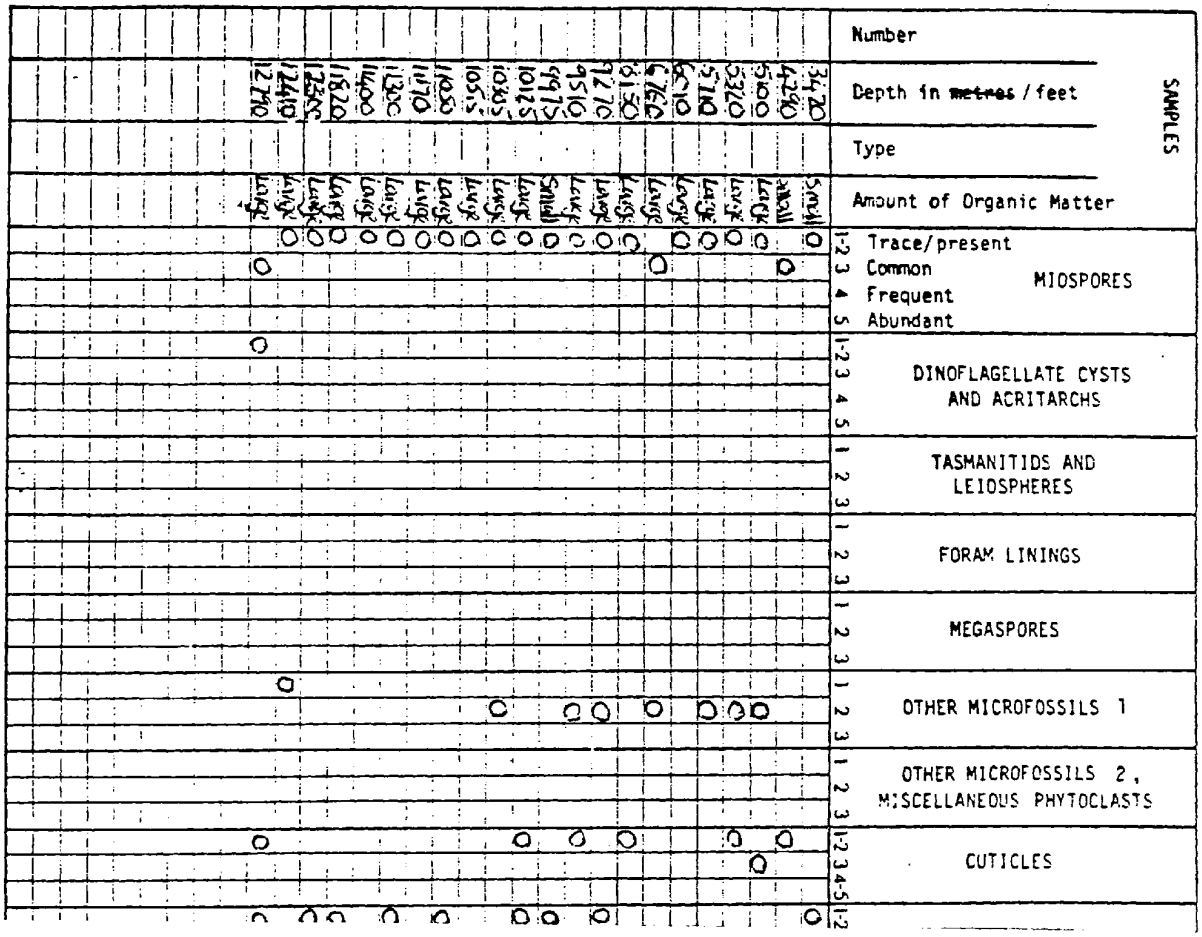

SAMPLES
Number
Depth in metres / feet
Type
Amount of Organic Matter
Small
Large
Trace/present
Common
Frequent
Abundant
MIOSPORES
DINOFLAGELLATE CYSTS AND ACRITARCHS
TASMANITIDS AND LEIOSPHERES
FORAM LININGS
MEGASPORES
OTHER MICROFOSSILS 1
OTHER MICROFOSSILS 2, MISCELLANEOUS PHYTOCLASTS
CUTICLES

TABLE 3

ROCK-EVAL AND PYROLYSIS DATA

WELL: SANDY RIVER-1
LOCATION: BRISTOL BAY, ALASKA

DEPTH (ft)	P1 KG/TONNE	P2 KG/TONNE	GOGI	TOC (%wt)	HYDROGEN INDEX
2820	0	0			
3180	0	0			
3420	.1	0			
3630	0	0			
3930	0	0			
4080	0	0			
4290	.3	.4			
4560	.2	0			
4860	.2	.4			
5100	.8	76.1	.71	47.3	160
5320	1.4	74.6	.78	46.8	159
5710	.2	0			
6010	.3	1.1			
6310	.1	1		1.7	58
6520	.4	.3			
6760	.2	.7		1.1	63
7150	.5	.6			
7600	1.3	.9		1	90
8150	.2	.7			
9075	1	1			
9270	.6	1		1.3	76
9510	.9	.4			
9645	3.6	79.4	.47	44.7	177
9975	1.1	.8			
10125	2.5	105.4	.54	37.5	281
10305	1.7	94.8	.65	45.1	210
10515	.8	108	.48	41.9	257
10755	2.6	136	.54	54.1	251
10845	2.1	1.2			
11050	4.9	161.1	.41	50.2	320
11170	3.3	20.7	.73	5.9	350
11300	5.7	178.3	.37	47.3	376
11440	1	5.2	.76	3.3	157
11550	1.8	4.4	.78	3.2	137
11820	2.1	15.8		4.2	376
12000	.5	1.6	.31	1.4	114
12220	.5	1.4			
12410	.5	1.2			
12790	.4	.9			
13050	6.2	24.4	1.15	9.5	256

TABLE 4

LITHOLOGY AND TOC DATA

WELL: SANDY RIVER-1
LOCATION: BRISTOL BAY, ALASKA

DEPTH(ft)	AGE/FM	PICKED LITHOLOGY	%TOC	%CARBONATE
3420	U.MIO-PLIO	SILTST	0.31	11
3930	U.MIO-PLIO	SILTST	0.25	7.4
4560	U.OLIG-M.MIO	MDST	0.63	14.5
5100	U.OLIG-M.MIO	COAL	47.3	14.9
5320	U.OLIG-M.MIO	COAL	46.8	18.3
6310	U.OLIG-M.MIO	SILTST	1.7	13.9
6760	U.OLIG-M.MIO	SILTST	1.1	11.9
7600	U.OLIG-M.MIO"	SILTST	1	13.5
9270	U.OLIG-M.MIO	SILTST	1.3	10.7
9645	U.OLIG-M.MIO	COAL	44.7	11.2
10125	U.OLIG-M.MIO	COAL	37.5	3.3
10305	U.OLIG-M.MIO	COAL	45.1	.18
10515	U.OLIG-M.MIO	COAL	41.9	2.5
10755	U.OLIG-M.MIO	COAL	54.1	2.1
11050	U.OLIG-M.MIO	COAL	50.2	2.7
11170	U.OLIG-M.MIO	MDST	5.9	5.2
11300	U.OLIG-M.MIO	COAL	47.3	2.5
11440	U.OLIG-M.MIO	MDST	3.3	8.8
11550	U.OLIG-M.MIO	SILTST	3.2	15.7
11820	U.OLIG-M.MIO	SILTST	4.2	5.3
12000	MID-U.OLIG	MDST	1.4	7.1
13050	MID-U.OLIG	MDST	9.5	4.6

TABLE 5

SEDIMENTS SOLUBLE EXTRACT DATA

WELL: SANDY RIVER-1
LOCATION: BRISTOL BAY, ALASKA

DEPTH (ft)	TOC %wt	TSE/TOC o/oo	SAC/TOC o/oo	CPI	ASPHALTENES %wt
10125	37.5	22	7	2.01	9.2
10755	54.1	15	2	1.88	21.8
11170	5.9	39	24	1.32	n.d.
11440	3.3	76	33	1.25	n.d.
11550	3.2	156	62	n.d.	11.5
12000	1.4	136	40	n.d.	17.3
13050	9.5	40	18	n.d.	17.4

TABLE 6

SEDIMENTS SOLUBLE EXTRACT DATA

WELL: SANDY RIVER-1
LOCATION: BRISTOL BAY, ALASKA

DEPTH(ft)	%SAC	%TSE	PRIST/PHYT	PRIST/C-17	PHYT/C-18
10125	29.4	.8	6	2.13	.57
10755	14.7	.8	10.6	3.18	.47
11170	62.1	.2	4.29	1.02	.69
11440	43.2	.3	4.05	.93	.59
11550	39.9	.5	3.41	.97	.69
12000	29.1	.2	4.81	.88	.58

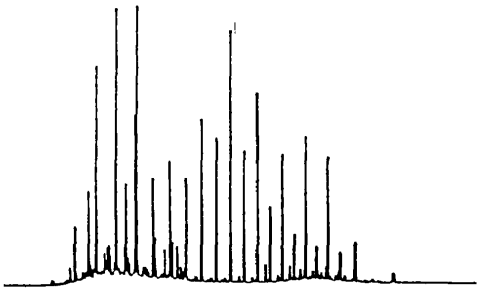
TABLE 7

CARBON ISOTOPES DATA

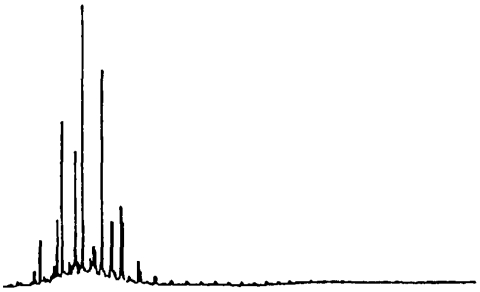
WELL: SANDY RIVER-1
LOCATION: BRISTOL BAY, ALASKA

DEPTH (Ft)	ISOTOPE RATIO PERMIL	SAMPLE TYPE
10125	-25.4	KEROGEN
10755	-25.8	KEROGEN
11170	-25.6	KEROGEN
11440	-25.5	KEROGEN
11550	-25.3	KEROGEN
11820	-25.3	KEROGEN
12000	-25.1	KEROGEN
13050	-25.1	KEROGEN

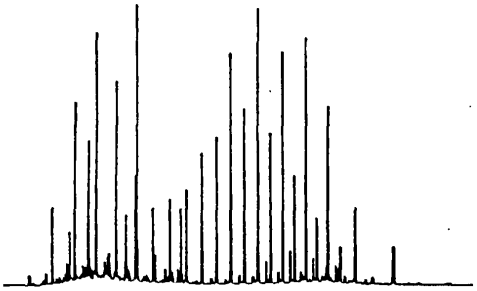
C-13/C-12 ISOTOPE RATIOS RELATIVE TO PDB STANDARD
SECONDARY STANDARD: NBS-22 AT -29.4 PERMIL



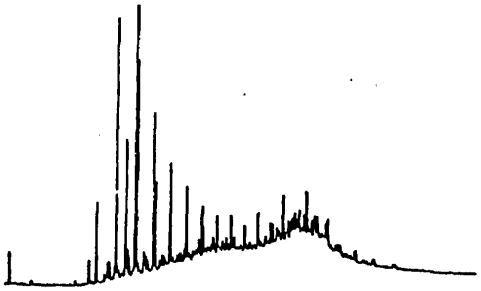
SAMPLE: 10125 Ft



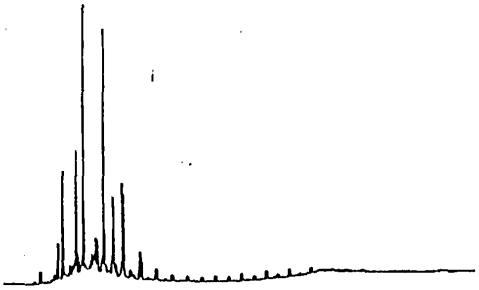
SAMPLE: 11440 Ft



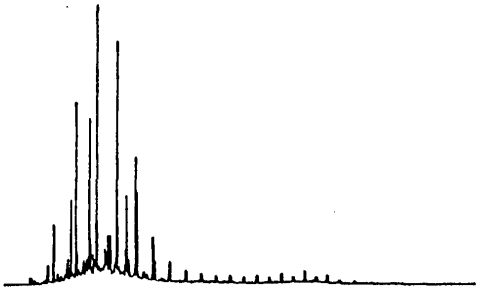
SAMPLE: 10755 Ft



SAMPLE: 11550 Ft



SAMPLE: 11170 Ft



SAMPLE: 12000 Ft

GEOCHEMISTRY BRANCH, BP SUNBUR
OPERATIONS GROUP

SAC FRACTION GAS CHROMATOGRAMS

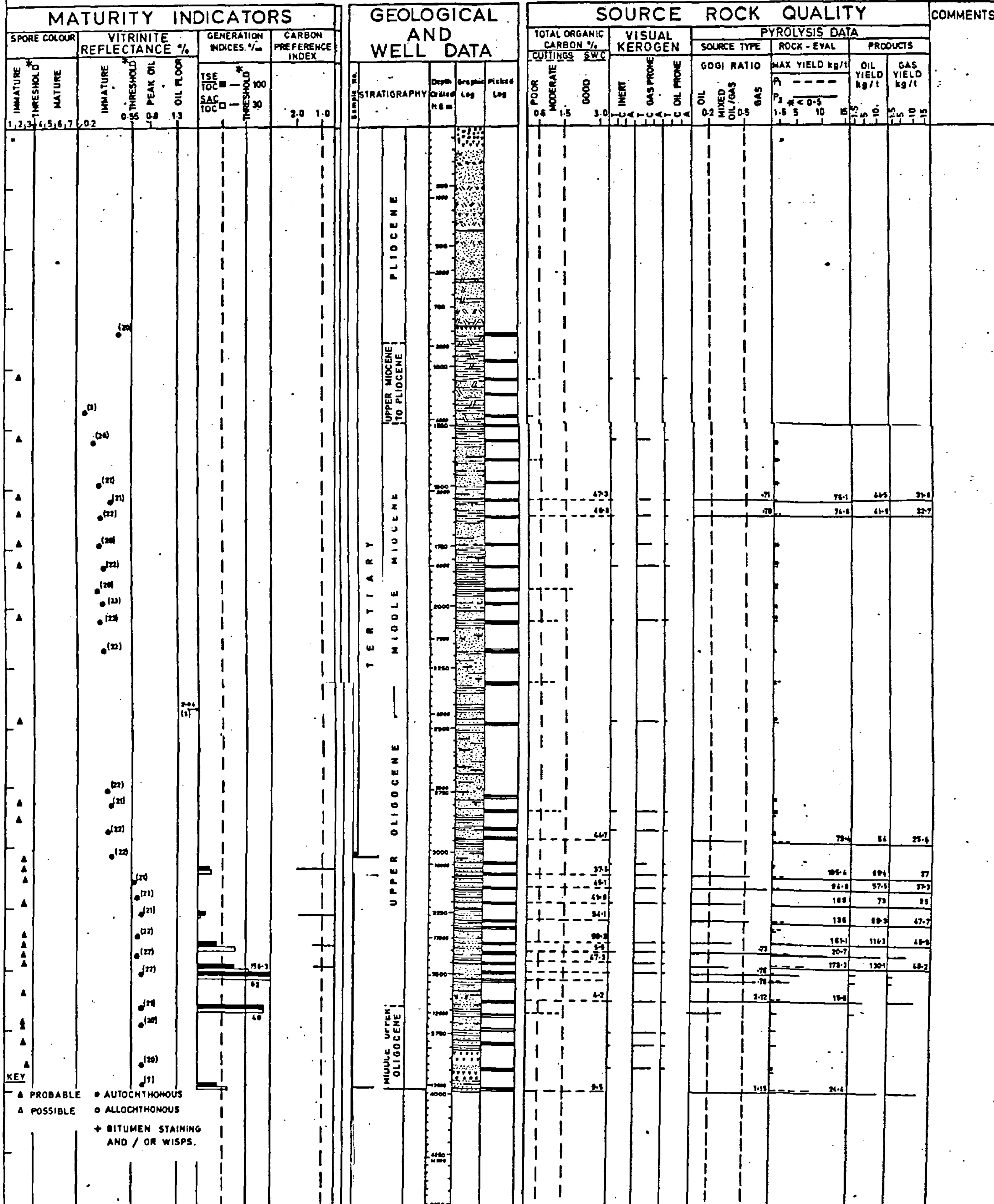
WELL: SANDY RIVER No. 1
LOCATION: BRISTOL BAY, ALASKA
OPERATOR: GULF OIL CORP.

Date Spudded: 4-9-63
Date Completed: 28-11-63
TD: 13063 ft.

BP RESEARCH CENTRE, SUNBURY. OPERATIONAL SERVICES GROUP.

PETROLEUM GEOCHEMICAL LOG

SCALE = 1: 10,000



NOTES

* Average Generation Threshold for Oil Prone Kerogens
TSE - Total Soluble Extract.
TOC - Total Organic Carbon.
SAC - Saturates Content.

Note

1. GOGI = Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-Eval). P_2 = Pyrolysed Hydrocarbon Yield from 250-550°C (Oil plus Gas), (Rock-Eval).
2. Source Rock Potential Ratings for PGC and Rock Eval (P_2 only) Yields are: <0.5, Insig: <1.5, Poor: >1.5-5, Moderate: > 5-15, Good: > 15, Very Good.
3. Values represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons actually reaching the reservoir may be only 1% of this Value.
4. Samples with Oil Yields of <1.5 kg/tonne or TOC'S of <0.5% are unlikely to generate sufficient Oil to commence migration.

WELL: SANDY RIVER No.1

LOCATION: BRISTOL BAY, ALASKA

OPERATOR: GULF OIL CORP.

Date Spudded: 4-9-63

Date Completed: 28-11-63

TD: 13063ft.

BP RESEA

PETF

MATURITY INDICATORS

SPORE COLOUR

IMMATURE | THRESHOLD * | MATURE

1 2 3 4 5 6 7

VITRINITE REFLECTANCE %

IMMATURE | THRESHOLD * | PEAK OIL | OIL FLOOR

0·2 | 0·55 | 0·8 | 1·3

(20) (3) (20) (21) (21) (22) (20) (22) (20) (23) (23) (22) 2·04 (3) (22) (21) (22) (22)

GENERATION INDICES. ‰

TSE / TOC ■ — 100

SAC / TOC □ — 30 THRESHOLD *

CARBON PREFERENCE INDEX

2·0 | 1·0

GEOLOGICAL AND WELL DATA

Sample No. | STRATIGRAPHY | Depth Drilled ft & m | Graphic Log | Picked Log

TERTIARY

PLIOCENE

UPPER MIOCENE TO PLIOCENE

MIDDLE MIOCENE

OLIGOCENE

250 1000 500 2000 750 3000 1000 4000 1250 1500 5000 1750 6000 2000 7000 2250 8000 2500 9000 2750 3000

SC

TOTAL ORGANIC CARBON %

CUTTINGS | SWC

POOR | MODERATE | GOOD

0·5 | 1·5 | 3·0

47·3

46·8

41·7

Date Spudded : 4-9-63
Date Completed : 28-11-63
TD : 13063 ft.

BP RESEARCH CENTRE, SUNBURY. OPERATIONAL SERVICES GROUP.

PETROLEUM GEOCHEMICAL LOG

SCALE = 1 : 10,000

GEOLOGICAL AND WELL DATA

Sample No. | STRATIGRAPHY | Depth Drilled ft & m | Graphic Log | Picked Log

TERTIARY
- PLIOCENE
- UPPER MIOCENE TO PLIOCENE
- MIDDLE MIOCENE
- OLIGOCENE

Depth Drilled ft & m: 250 1000 500 2000 750 3000 1000 4000 1250 1500 5000 1750 6000 2000 7000 2250 8000 2500 9000 2750 3000

SOURCE ROCK QUALITY

TOTAL ORGANIC CARBON %

CUTTINGS | SWC

POOR | MODERATE | GOOD
0·5 | 1·5 | 3·0

47·3
46·8
44·7

VISUAL KEROGEN

INERT | GAS PRONE | OIL PRONE
T C A | T C A | T C A

PYROLYSIS DATA

SOURCE TYPE

GOGI RATIO

OIL | MIXED OIL/GAS | GAS
0·2 | 0·5

·71
·78

ROCK - EVAL

MAX YIELD kg/t

P_1 ----
P_2 * < 0·5

1·5 5 10 15

76·1
74·6
79·4

PRODUCTS

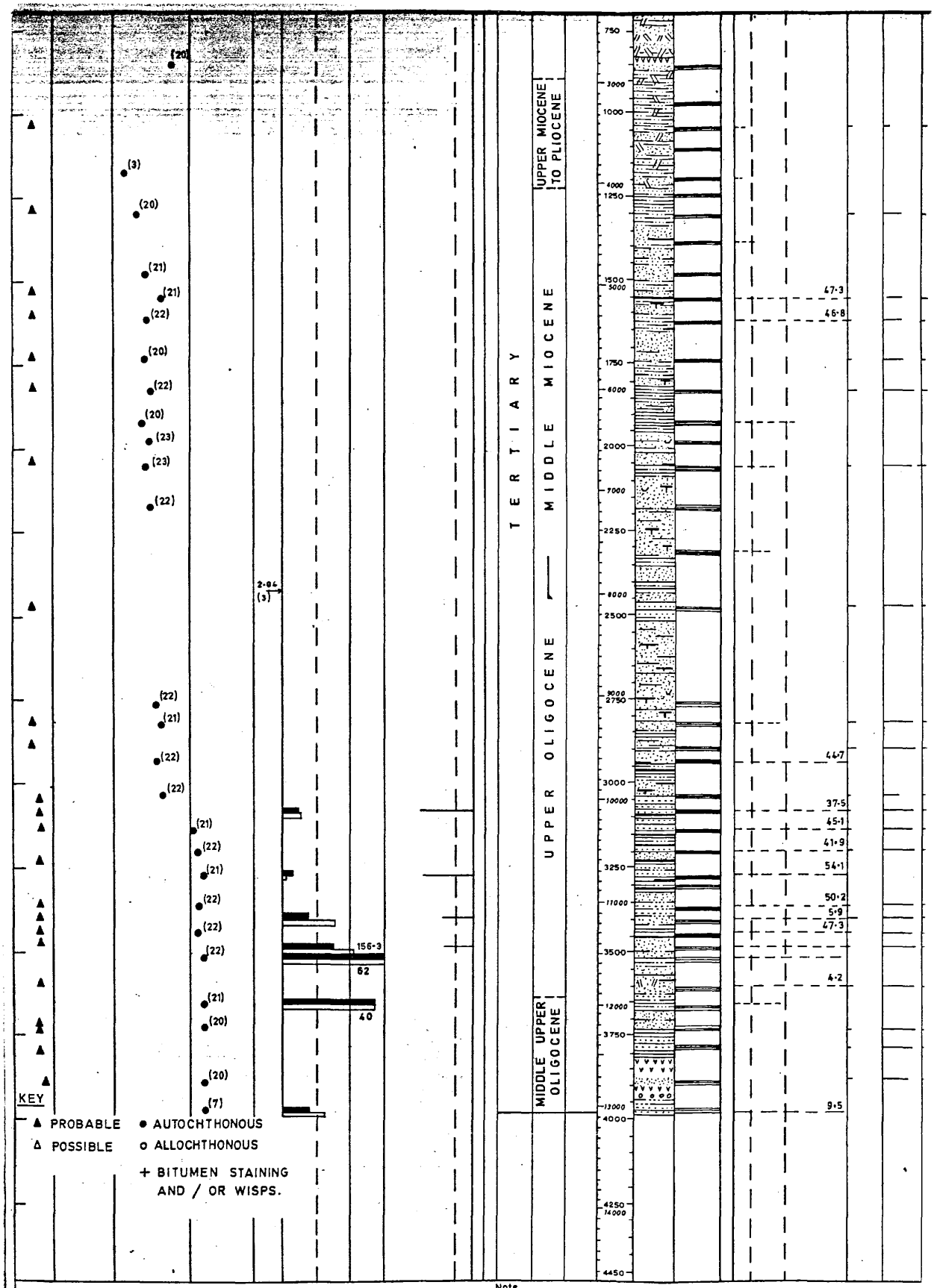
OIL YIELD kg/t
1·5 5 10

44·5
41·9
84

GAS YIELD kg/t
1·5 5 10 15

31·6
32·7
25·4

COMMENTS

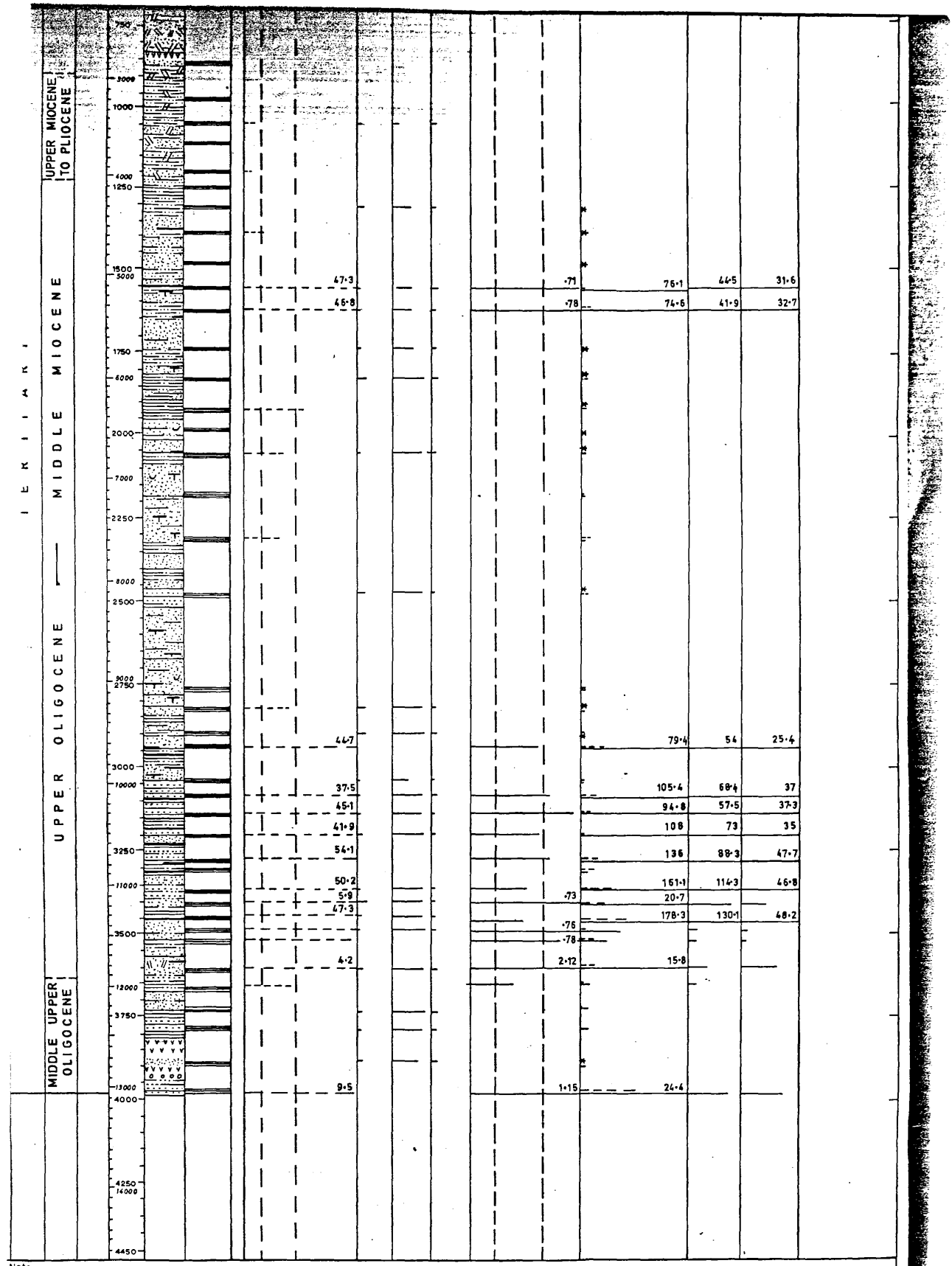


NOTES

* Average Generation Threshold for Oil Prone Kerogens.
TSE - Total Soluble Extract.
TOC - Total Organic Carbon.
SAC - Saturates Content.

Note

1. GOGI = Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-E
2. Source Rock Potential Ratings for PGC and Rock Eval (P_2 only) Yields are :-<
3. Values represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons
4. Samples with Oil Yields of < 1.5 kg/tonne or TOC'S of < 0.5 % are unlikely to



Note

1. GOGI = Gas/Oil Generation Index (PGC): P_1 = Hydrocarbon Yield at 250°C, (Rock-Eval). P_2 = Pyrolysed Hydrocarbon Yield from 250-550°C (Oil plus Gas), (Rock-Eval).
2. Source Rock Potential Ratings for PGC and Rock Eval (P_2 only) Yields are :- < 0.5, Insig: < 1.5, Poor :> 1.5-5, Moderate :> 5-15, Good :> 15, Very Good.
3. Values represent Maximum Theoretical Yields in kg/tonne. Amount of Hydrocarbons actually reaching the reservoir may be only 1 % of this Value.
4. Samples with Oil Yields of < 1.5 kg/tonne or TOC'S of < 0.5 % are unlikely to generate sufficient Oil to commence migration.