W783

WELL COMPLETION REPORT

DISCOVERY BAY NO.1 W783

PERMIT VIC/P14

VICTORIA

2 3 MAR 1983

OIL and GAS DIVISION

PHILLIPS PETROLEUM

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PHILLIPS AUSTRALIAN OIL COMPANY

PERTH, WESTERN AUSTRALIA

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By

PHILLIPS AUSTRALIAN OIL COMPANY

Perth, Australia

February, 1983

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* Interpretive and confidential data

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* Interpretive and confidential data

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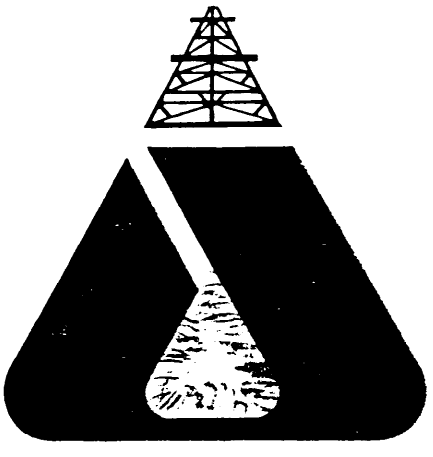
PETROLEUM GEOCHEMISTRY

DISCOVERY BAY No. 1



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PHILLIPS AUSTRALIAN OIL CO.

DISCOVERY BAY NO. 1

SUMMARY

Organic geochemical analyses carried out on cutting samples from well intervals 1215m to 1370m, 1655m to 1930m and 2295m to 2770m in the Phillips Australian Oil Co. Discovery Bay No. 1 Well have indicated the following:

- The fine grain rocks contained within well intervals 1215m to 1370m and 1655m to 1930m have an immature, poor hydrocarbon source character. At a more mature thermal maturity these sediments may have generated good amounts of gaseous hydrocarbons.

- The fine grain rocks within well interval 2295m to 2770m have attained marginal thermal maturity and have generated minor amounts of liquid hydrocarbon at zones 2315m to 2370m and 2595m to 2630m.

This study focuses exploration attention on encountering these organic rich sediments at a more mature position within the basin. At a higher level of thermal maturity, moderate to good quantities of gas and minor to moderate quantities of oil could have been generated and expelled into available reservoirs.

Paul Tybor

Paul Tybor
Analabs

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INTRODUCTION

Organic geochemical analyses have been carried out on thirty five (35) well cuttings samples from the Phillips Australian Oil Co. Discovery Bay No. 1 Well.

The purpose of this study is to evaluate the hydrocarbon generating capability of the sediments penetrated by the Discovery Bay No. 1 Well.

Analytical

Upon receiving the samples, the following analytical program was implemented.

Type of Analyses	Table	Figure
C_1 - C_4 light hydrocarbon gas chromatography	I	
% Total organic carbon screen analysis	II	I
Pyrolysis	II	I

General Information

All data and interpretations given herein by Analabs are proprietary to the Phillips Australian Oil Co. Two (2) copies of this report have been sent to Mr. Gale Yarrow of Phillips at their Perth Office.

Any questions related to this study may be directed to Paul Tybor or Gary Woodhouse at Analabs in Perth W.A.

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DISCUSSION OF THE RESULTS

A. Hydrocarbon Source Rock Evaluation

Within the sedimentary section penetrated by this well, three (3) intervals were evaluated geochemically and are as follows:

1. 1215m to 1370m
2. 1670m to 1930m
3. 2310m to 2770m

1. 1215m to 1370m

The rocks within well interval 1215m to 1370m have an apparent immature thermal maturity with poor hydrocarbon source characteristics. These rocks at a more mature level of maturation may have generated moderate amounts of predominantly gaseous hydrocarbon.

The apparent immature thermal maturity placed on this interval is based solely on the low Tmax and Production Index (Figure I, Table II) values obtained from the samples from this interval. It should be noted that Tmax and Production Index data are not as difinitive measurements of thermal maturity as are Thermal Alteration Index (TAI) or Vitrinite Reflectance (%Ro) data, hence the apparent immature rating has been given.

The poor hydrocarbon source character given to these sediments is based on the poor volumes of gas (Table I) and poor free hydrocarbon yields (S_1; Figure I Table II) obtained from the samples, even though good amounts of organic matter (% TOC Figure I Table II) were analysed from these samples. This is probably due to the immature nature of these rocks which have not experienced sufficient time and temperature to generate any significant quantities of hydrocarbon.

The organic matter contained in these rocks is probably the gas-prone variety, due to the low hydrogen indices and high oxygen indices calculated for the samples (Table II). Consequently at a more mature position within the basin this interval would be expected to have generated fair to good amounts of predominantly gas. Here also, there are analyses available which provide better insight into the types of organic matter present in rocks (visual kerogen and coal maceral identification) than does the hydrogen and oxygen index.

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2. 1670m to 1930m

Well interval 1670m to 1930m contain rocks which have good amounts of organic matter (1.31% mean TOC, Figure I, Table II), however, this interval also yielded low Tmax and Production Index values, which suggest thermal immaturity. Low S_1 (Figure I, Table II) values were recorded from the samples comprising this interval. As a result this unit is characterised as an apparent immature, poor hydrocarbon source unit, which has the potential of generating good amounts of predominantly gaseous hydrocarbons at a more mature geothermal regime. These rocks are also gas-prone due to the low hydrogen indices and moderately high oxygen indices (Figure I, Table III).

3. 2310m to 2770m

The rocks comprising well interval 2310m to 2770m have apparently experienced a slightly higher geothermal history, than the sediments contained in the two overlying intervals. This is evidenced by the slightly higher Tmax values obtained from the samples from this lower zone. Consequently, minor to moderate hydrocarbon generation has occurred from the good amounts of organic matter (% TOC, Figure I, Table II) contained in these rocks. This hydrocarbon generation is evidenced by the fair S_1 peak values obtained from the samples from intervals 2315m to 2330m, 2355m to 2370m, 2595m to 2610m and 2615m to 2630m. At these intervals, the hydrogen indices are slightly higher than the hydrogen indices of the other samples, and are approaching a hydrogen index value of 100 (Figure I, Table II). Also, the oxygen indices of the samples from this lower most interval are generally lower than those of the samples from the two overlying intervals. This suggests that the rocks encountered within the lower portion of this well are more oil-prone than the overlying sediments

As a result, the rocks comprising well interval 2310m to 2770m are marginally mature, based on Tmax values, which have generated minor to moderate amounts of hydrocarbon at intervals 2315m to 2330m, 2355m to 2370m, 2595m to 2610m and 2615m to 2630.

B. Exploration Significance

In the general vicinity of this well, the reservoir traps in communication with the fair hydrocarbon source rocks of intervals 2315m to 2330m, 2355m to 2370m, 2595m to 2610m and 2615m to 2630m, may contain minor amounts of liquid and gaseous hydrocarbons.

The remaining sediments analysed contain good amounts of organic matter. However, the type is apparently gas-prone, which has not given off significant quantities of gas at the apparent low thermal maturities analysed in the bulk of the sediments, sampled from this well.

On a regional basis, the explorationist should attempt to define where in the basin these sediments have attained thermal maturity. At a more mature position in the basin, the organic rich sediments in intervals 1 (1215m to 1370m) and 2 (1655m to 1630m) would be expected to have generated good amounts of gas. Furthermore the rocks in interval 3 (2295m to 2770m) could have generated moderate amounts of oil and good amounts of gas at mature levels of thermal maturation.

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TABLE I

LIGHT HYDROCARBON DATA

DEPTH(m)	%METHANE	%ETHANE	%PROPANE	%ISOBUTANE	%BUTANE	i-C4/n-C4	VOL. GAS(ul/Kg)	C2+/C1	C2/C1	C3+/C1
1235.0-1250.0	92.8	4.6	1.8	0.6	0.3	2.02	50.1	.078	.049	.029
1355.0-1370.0	91.5	6.2	1.5	0.5	0.2	2.00	41.9	.092	.068	.025
1715.0-1730.0	71.4	20.0	7.4	0.7	0.5	1.35	11.9	.401	.281	.120
1815.0-1330.0	72.9	10.9	10.8	2.9	2.5	1.16	11.3	.372	.150	.222
1835.0-1350.0	68.0	14.4	9.8	4.2	3.6	1.16	9.8	.470	.211	.258
1855.0-1370.0	53.1	27.0	14.3	3.1	2.6	1.21	11.3	.883	.508	.375
1875.0-1390.0	42.8	29.3	18.8	5.2	3.9	1.33	7.5	1.334	.685	.649
1895.0-1910.0	35.5	40.8	15.5	4.5	3.7	1.21	9.1	1.816	1.150	.666
1915.0-1930.0	30.8	48.1	14.6	3.7	2.9	1.27	12.4	2.249	1.562	.686
2295.0-2310.0	64.2	17.5	13.8	3.2	1.4	2.33	23.4	.557	.272	.285
2315.0-2330.0	65.4	19.4	11.3	2.7	1.2	2.28	15.8	.529	.296	.232
2335.0-2350.0	58.6	24.0	13.4	2.8	1.2	2.37	19.8	.706	.409	.296
2355.0-2370.0	61.4	22.6	8.8	4.8	2.4	2.03	26.4	.629	.368	.261
2375.0-2390.0	68.5	20.6	8.1	2.0	0.8	2.63	48.6	.459	.300	.159
2395.0-2410.0	70.2	19.0	6.7	2.7	1.3	2.05	90.3	.424	.271	.153
2475.0-2490.0	66.2	23.5	6.4	2.6	1.2	2.07	103.6	.510	.355	.155
2495.0-2510.0	69.6	21.6	5.7	2.1	1.0	2.09	158.3	.437	.310	.127
2595.0-2610.0	53.3	26.7	12.8	5.1	2.1	2.36	232.5	.875	.500	.375
2615.0-2630.0	61.6	24.3	7.3	4.3	2.4	1.77	193.2	.622	.395	.228
2635.0-2650.0	54.3	23.9	10.8	7.6	3.5	2.16	177.4	.841	.439	.401
2655.0-2670.0	50.3	21.1	14.9	9.5	4.1	2.31	76.7	.988	.420	.567
2675.0-2690.0	49.4	22.2	15.2	9.3	3.9	2.41	57.6	1.025	.450	.574
2695.0-2710.0	59.1	18.0	12.6	6.9	3.3	2.08	124.0	.692	.305	.386
2715.0-2730.0	65.5	15.2	10.4	5.4	3.5	1.53	146.7	.526	.231	.295
2735.0-2750.0	46.0	19.1	17.9	11.1	5.9	1.90	70.8	1.173	.414	.759
2755.0-2770.0	56.1	13.2	15.3	9.7	5.7	1.70	65.1	.784	.235	.549

TABLE II

WELLNAME = DISCOVERY BAY NO.1

DATE OF JOB = NOVEMBER 1982

ROCK-EVAL PYROLYSIS DATA

DEPTH(M)	TMAX	S1	S2	S3	S1+S2	S2/S3	PI	PC	TOC	HI	OI
1215.0-1230.0	nd	nd	nd	nd	nd	nd	nd	nd	0.69	nd	nd
1235.0-1250.0	419	0.09	0.88	1.59	0.97	0.55	0.09	0.08	1.23	71	129
1255.0-1270.0	421	0.11	1.03	1.40	1.14	0.74	0.10	0.09	1.33	77	105
1355.0-1370.0	413	0.08	0.51	0.89	0.59	0.57	0.14	0.05	1.04	49	85
1655.0-1670.0	425	0.11	0.76	0.81	0.87	0.94	0.13	0.07	1.04	73	77
1675.0-1690.0	422	0.18	1.13	1.22	1.31	0.93	0.14	0.11	1.33	84	91
1695.0-1710.0	426	0.10	0.82	0.80	0.92	1.03	0.11	0.08	1.01	81	79
1715.0-1730.0	428	0.13	1.07	0.95	1.20	1.13	0.11	0.10	1.24	86	76
1735.0-1750.0	430	0.13	1.03	1.10	1.16	0.94	0.11	0.10	1.42	72	77
1755.0-1770.0	425	0.12	1.02	1.23	1.14	0.83	0.11	0.09	1.47	69	83
1775.0-1790.0	427	0.12	0.95	1.05	1.07	0.90	0.11	0.09	1.38	68	76
1795.0-1810.0	nd	nd	nd	nd	nd	nd	nd	nd	0.85	nd	nd
1815.0-1830.0	426	0.16	0.84	0.67	1.00	1.25	0.16	0.08	1.10	76	60
1835.0-1850.0	425	0.14	1.13	1.07	1.27	1.06	0.11	0.11	1.58	71	67
1855.0-1870.0	427	0.13	1.21	1.20	1.34	1.01	0.10	0.11	1.57	77	76
1875.0-1890.0	422	0.22	1.51	1.53	1.73	0.99	0.13	0.14	1.62	93	94
1895.0-1910.0	426	0.13	1.25	1.19	1.38	1.05	0.09	0.11	1.43	87	83
1915.0-1930.0	428	0.10	1.10	0.97	1.20	1.13	0.08	0.10	1.34	82	72
2295.0-2310.0	429	0.17	1.02	0.89	1.19	1.15	0.14	0.10	1.31	77	67
2315.0-2330.0	425	0.25	1.13	0.81	1.38	1.40	0.18	0.11	1.28	88	63
2335.0-2350.0	nd	nd	nd	nd	nd	nd	nd	nd	0.91	nd	nd
2355.0-2370.0	423	0.32	1.77	1.01	2.09	1.75	0.15	0.17	1.74	101	58
2375.0-2390.0	430	0.17	1.51	1.13	1.68	1.34	0.10	0.14	1.88	80	60
2395.0-2410.0	428	0.16	1.18	0.83	1.34	1.42	0.12	0.11	1.51	78	54
2475.0-2490.0	428	0.17	0.97	0.76	1.14	1.28	0.15	0.09	1.17	82	64
2495.0-2510.0	431	0.16	1.40	0.87	1.56	1.61	0.10	0.13	1.45	96	60
2595.0-2610.0	427	0.30	1.33	1.15	1.63	1.16	0.18	0.14	1.39	95	82
2615.0-2630.0	426	0.24	1.57	1.19	1.81	1.32	0.13	0.15	1.78	88	66
2635.0-2650.0	428	0.14	1.03	0.65	1.17	1.58	0.12	0.10	1.39	74	46
2655.0-2670.0	nd	nd	nd	nd	nd	nd	nd	nd	0.95	nd	nd
2675.0-2690.0	nd	nd	nd	nd	nd	nd	nd	nd	0.55	nd	nd
2695.0-2710.0	431	0.13	1.07	0.63	1.20	1.70	0.11	0.10	1.41	75	44
2715.0-2730.0	430	0.14	1.04	0.51	1.18	2.04	0.12	0.10	1.41	73	36
2735.0-2750.0	430	0.13	0.84	0.41	0.97	2.05	0.13	0.08	1.14	73	35
2755.0-2770.0	nd	nd	nd	nd	nd	nd	nd	nd	0.67	nd	nd

LOG ANALYSIS

Table 1 lists all the wireline logs run at Discovery Bay No.1. The final Computer Well Log Plot (CPI), a composite of log analyses for Runs 1 (450-1190m) and Run 2 (1199-2766m) respectively, indicates no potential hydrocarbon productive zones (Enclosure 6).

The primary water saturation parameters for this analysis are:

aRw = 0.38 ohm/m at 82°C (180°F),
where 'a' is the Formation Resistivity Factory Constant = 1
Cementation Exponent (m) = 1.8 (Sandstones), 2 (Limestones)
Saturation Exponent (n) = 2.0

Lithological descriptions from several sources were used to choose the appropriate coding. However, the mud log, the litholog, the daily reports, and the sidewall core descriptions are not entirely consistent. Consequently, the lithology portrayed on the Well Log Print may not exactly match the final interpretation on the Composite Log.

Thin hydrocarbon-bearing zones are apparent on the Computer Well Log Plot between 750-768 metres, 792-802 metres, and 855-874 metres respectively, with water saturations in the 80-90% range. These zones exhibit a false hydrocarbon content probably caused by the presence of freshwater or the difference in lithology between these zones and the average sandstone zones which were used to determine the basic saturation parameters.

TABLE NO.1

DISCOVERY BAY NO.1 WIRELINE LOGS

TYPE	INTERVAL	SCALE
Run 1		
DIL-SLS-GR	435-1210m	1:200, 1:500
Run 2		
DIL-SLS-GR	1199-2776m	1:200, 1:500
LDL-CNL-GR	1199-2776m	1:200, 1:500
HDT	1199-2776m	1:200, 1:500

THEORY AND METHOD

1. PREPARATION OF SAMPLES

The samples provided for geochemical studies are firstly, where necessary, carefully air dried. Then they are crushed to 1/8" chips using a van Gelder jaw crusher, and finally they are crushed to 0.1mm using an NV Tema grinder.

2. TOC DETERMINATIONS

The total organic carbon value (TOC) was determined on the unextracted sediment sample. The value was determined by treating a known weight of sediment with dilute HCl to remove carbonate minerals, and then heating the residue to approximately 1700 ^{o}C (Leco Induction Furnace) in an atmosphere of pure oxygen. The carbon dioxide produced was absorbed on a "Carbosorb" tower. The weight of carbon dioxide produced was then used to calculate %TOC in the sediment.

3. ROCK-EVAL PYROLYSIS

Rock-Eval pyrolysis is carried out by placing approximately 100mg of the crushed sample into a crucible and then subjecting it to the following pyrolysis cycle:

Stage (i) - Sample purged with helium for 3.5 minutes outside of heated part of pyrolysis furnace;

Stage (ii) - Sample heated at 300^{o}C for 3 minutes to liberate free petroleum (S_1 peak);

Stage (iii)- Sample heated from 300^{o}C to 550^{o}C at 25^{o}C/minute to produce petroleum from kerogen (S_2 peak). The furnace is maintained at 550^{o}C for one minute. Carbon dioxide produced during this pyrolysis up to 390^{o}C (550^{o}C in the case of the carbonate-free sediment) is absorbed on a special column;

Stage (iv) - During cool-down period the carbon dioxide produced during pyrolysis is measured (S_3 peak).

The units used for Rock-Eval data are as follows:

S_1, S_2, S_3 = kg/tonne of rock
T_{max} = ^{o}C
Hydrogen Index = mg HC/g TOC
Oxygen Index = mg CO_2/g TOC

Rock-Eval data is most commonly used in the following manner:

(i) S_1 - indicates the level of oil and/or gas already generated by the sample.

(ii) S_1+S_2 - referred to as the genetic potential this parameter is used for source rock evaluation according to the following criteria:

<2	kg/tonne	Poor
2-6	kg/tonne	Moderate
>6	kg/tonne	Good

(iii) $S_1/(S_1+S_2)$ - this parameter is the production index which is a measure of the level of maturity of the sample.

(iv) T_{max} - the temperature corresponding to the S_2 maxima. This temperature increases with increasingly mature sediments.

(v) HI, OI - the hydrogen ($[S_2 x 100]/TOC$) and oxygen ($[S_3 x 100]/TOC$) indices when plotted against one another provide information about the type of kerogen contained in the sample and the maturity of the sample.

4. HEADSPACE ANALYSIS

Headspace analysis is carried out on sealed containers (usually tinned cans) of wet cuttings. The containers are approximately three quarters filled with the cuttings to leave an appreciable headspace into which volatile hydrocarbons contained in the cuttings diffuse.

The analysis involves placing a small hole (1/16" diamter) in the container lid, sampling 1 ml of the headspace gas with a gas injection syringe, and finally gas chromatographing this sample of gas under the following conditions: instrument = Varian Aerograph 1440 equipped with an FID; column = 3 m x 1/8" Chromosorb 102; temperature program = 70°C for 1.5 mins then up to 140°C at 15°C/min; carrier gas = nitrogen at 23 mls/min; injector temperature = 50°C; detector temperature = 200°C. After each analysis the gas chromatograph is heated at 200°C for 8 minutes to remove the C_5 + components from the column.

The integrated areas of peaks representing each of the C_1-C_4 components of the headspace gas are corrected for their relative weight and

volume detector responses, and their concentrations are reported as volume (or molar) %. If requested a semi-quantitative estimate of the amount of gas in the headspace is determined by comparison of the data for the sample gas to that for a known volume of a standard gas of known composition and accounting for the approximate volume of the headspace.

Data from headspace analysis is commonly used to identify the zone of oil generation by plotting the proportion of C_2 + components (either C_2+/C_1 or % C_2+) against sediment burial depth. Gas containing appreciable quantities of C_2+ components, termed wet gas (Fuex, 1977), is generally considered to be gas associated with oil generation. In addition, the the ratio of isomeric butanes can sometimes be used for assessment of sediment maturity (Alexander et al., 1981). The amount of gas in sediments can be used to identify zones of significant gas generation and out-of-place gas.

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APPENDIX NO.9

BASIC HYDROCARBON SOURCE ROCK POTENTIAL

AND

VITRINITE REFLECTANCE ANALYSIS

PHILLIPS 66

INTER-OFFICE CORRESPONDENCE / SUBJECT:
BARTLESVILLE, OKLAHOMA

December 2, 1982

Basic Hydrocarbon Source Rock Potential Analysis of the PPCo Discovery Bay No. 1 Well, Otway Basin, Offshore Australia.
Charge No. RA4053
EPS Report No. 2368L

BVP-215-82

O. J. Koop (r) N. C. Tallis
Perth Office

N. C. Tallis' letter to H. A. Kuehnert dated Oct. 19, 1982 requested source rock analyses of the PPCo. Discovery Bay No. 1 well, offshore Australia. The study of 16 sidewall core samples and 10 ditch cutting samples from this well is complete. The results indicate that there is no significant source rock potential in any of these samples at their present level of thermal maturity.

A summary of these results was reported by telex on Nov. 11, 1982. Included in this report are a source rock plot and a pyrolysis data chart which help to display the various source rock potential parameters. Kerogen and pyrolysis printouts on all samples are also included.

Although 18 of these samples have rich levels of organic carbon (TOC > 1.0% by weight) and 6 others have fair levels (0.5 to 1.0%), only 6 samples have a dominantly oil prone kerogen content. Sixteen samples have dominantly gas prone kerogen, whereas 4 samples have approximately equal amounts of oil and gas prone kerogen (see printout). Vitrinite reflectance values on these samples range from Ro 0.51 at 844 meters to Ro 0.66 at 2776 meters T.D. These values indicate only an early stage thermal maturity; i.e., not yet into the peak range for oil generation. Spore coloration index values (TAI) ranging from 2 to 3- support this maturity level.

Given the above data alone, secondary liquid hydrocarbon source rock potential is indicated. However, the pyrolysis data do not support this interpretation. The hydrogen index values of these samples indicate that the oil prone kerogen present was apparently subjected to oxidation prior to or during burial which destroyed its oil potential. This conclusion would seem to relate well to the sandstone/siltstone lithologies described in the sidewall core descriptions and well logs.

All things considered, therefore, no significant source rock potential is indicated in any of these samples at their present level of thermal maturity. Given greater depth of burial, and consequent greater thermal maturity, only dry gas source rock potential of questionable significance could be expected.

As of this date we have not received samples from our second well in this area. When received, it will also be assigned a high priority status.

Dennis R. Logan

Approved: E. A. Stanley

DRL/sjv

Attachments

cc: W. E. Ryker
K. Lyons (r) B. W. Knuth
L. H. Hoelscher (r) J. A. Standridge
H. A. Kuehnert (r) D. W. Dalrymple

DISCOVERY BAY #1, OFFSHORE VICTORIA, AUSTRALIA

PYROLYSIS DATA

DEPTH RANGE METERS	TOTAL ORGANIC CARBON WEIGHT %	S1 PEAK MG.HC/ G.ROCK	S2 PEAK MG.HC/ G.ROCK	PRODUCTION INDEX S1/(S1+S2)	TEH/TOC MG.HC/ G.ORG.C	HYDROGEN INDEX MG.HC/G.ORG.C		
844- 844	1.18	0.080	0.320	0.20	6.8	27.1	SWC	GI82ECM
1026- 1026	2.70	0.120	2.130	0.05	4.4	78.9	SWC	GI82ECN
1150- 1150	2.15	0.100	1.550	0.06	4.7	72.1	SWC	GI82ECO
1240- 1240	1.41	0.080	0.760	0.10	5.7	53.9	SWC	GI82ECP
1306- 1306	0.98	0.050	0.270	0.16	5.1	27.6	SWC	GI82ECQ
1400- 1400	1.42	0.060	0.470	0.11	4.2	33.1	SWC	GI82ECR
1562- 1562	1.88	0.110	0.880	0.11	5.9	46.8	SWC	GI82ECS
1687- 1687	2.38	0.180	1.490	0.11	7.6	62.6	SWC	GI82ECT
1797- 1797	1.99	0.320	1.160	0.22	16.1	58.3	SWC	GI82ECU
1908- 1908	1.27	0.080	0.610	0.12	6.3	48.0	SWC	GI82ECV
2047- 2047	2.97	0.070	1.680	0.04	2.4	56.6	SWC	GI82ECW
2260- 2260	2.72	0.070	1.340	0.05	2.6	49.3	SWC	GI82EC
2418- 2418	2.04	0.090	0.780	0.10	4.4	38.2	SWC	GI82ECY
2505- 2505	2.13	0.100	1.340	0.07	4.7	62.9	SWC	GI82ECZ
2633- 2633	2.56	0.090	1.420	0.06	3.5	55.5	SWC	GI82EDA
2772- 2772	2.11	0.160	1.360	0.11	7.6	64.5	SWC	GI82EDB
1410- 1410	0.33	0.040	0.100	0.29	12.1	30.3	CUT	GI82EDC
1565- 1565	0.71	0.070	0.180	0.28	9.9	25.4	CUT	GI82EDD
1715- 1715	1.27	0.070	0.690	0.09	5.5	54.3	CUT	GI82EDE
1970- 1970	2.13	0.070	1.940	0.03	3.3	91.1	CUT	GI82EDF
2060- 2060	0.57	0.070	0.200	0.26	12.3	35.1	CUT	GI82EDG
2175- 2175	0.78	0.050	0.410	0.11	6.4	52.6	CUT	GI82EDH
2305- 2305	1.39	0.080	1.290	0.06	5.8	92.8	CUT	GI82EDI
2475- 2475	0.71	0.120	0.470	0.20	16.9	66.2	CUT	GI82EDJ
2590- 2590	0.44	0.050	0.250	0.17	11.4	56.8	CUT	GI82EDK
2776- 2776	0.82	0.090	0.560	0.14	11.0	68.3	CUT	GI82EDL

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INTERVAL (METERS) TOP		TYPE	TPI	NORMALIZED TO 100% BY VOLUME (LIQUID PRONE) ALGI- NITE	(GAS PRONE) VITRI- NITE	INERTI- NITE	RO MEAN	STND. DEV	MODE	RANGE LOW	HIGH	NO. OF VIT. READINGS	TOTAL ORGANIC CARBON (WT %)	EXTR ORG MAT (PP
844.													1.18	
1026.		SW					0.51	0.04	0.50	0.45	0.59	84	2.70	
1150.							0.51	0.03	0.52	0.46	0.58	83	2.15	
1240.		SW					0.52	0.03	0.50	0.45	0.59	94	1.41	
1306.													0.97	
1401.		SW					0.56	0.04	0.50	0.48	0.64	42	1.42	
1410.		CC					0.55	0.05	0.54	0.47	0.63	43	0.33	
1562.		SW											1.88	
1565.		CC					0.56	0.02	0.56	0.52	0.59	35	0.71	
1687.		SW					0.52	0.04	0.49	0.45	0.60	92	2.38	
1715.		CC					0.56	0.05	0.54	0.51	0.59	37	1.27	
1736.		SW					0.52	0.02	0.53	0.49	0.56	48	1.99	
1908.		SW					0.59	0.03	0.60	0.50	0.64	54	1.27	
1970.		CC					0.58	0.04	0.60	0.52	0.64	38	2.13	
2047.		SW					0.55	0.05	0.52	0.45	0.65	23	2.97	
2060.		CC					0.59	0.04	0.58	0.50	0.68	74	0.57	
2175.		CC											0.78	
2260.		SW					0.59	0.04	0.55	0.52	0.67	47	2.72	
2305.		CC					0.62	0.05	0.60	0.52	0.71	71	1.39	
2418.		SW					0.63	0.05	0.60	0.53	0.74	61	2.04	
2475.		CC											0.71	
2505.							0.63	0.04	0.59	0.55	0.73	79	2.13	
2590.		CC					0.66	0.03	0.66	0.61	0.71	17	0.44	
2633.		SW					0.67	0.06	0.66	0.54	0.81	83	2.56	
2772.		SW					0.66	0.05	0.60	0.59	0.75	61	2.11	
2776.		CC					0.66	0.02	0.67	0.62	0.69	8	0.82	

TERMINOLOGY USED FOR SOURCE ROCK PLOT

(1-2 YELLOW) (2-3 BROWN) (3-4 DARK BROWN) (5 BLACK)

= ORIGINAL ALTERNATING TIME (SPORE COLOR)

= ALGINITE + PLANT CUTICLES + RESINS + OTHER STRONGLY FLUORESCENT ORGANIC MATERIALS + AMORPHOUS HUMACEOUS (IF RECOGNIZABLE AS FROM TERRESTRIAL SOURCE - IF NOT IT IS RECORDED UNDER ALGINITE)

= (ALGAL BODIES - CYSTO AND BODIES) + AMORPHOUS SAPROPEL

= BODY TISSUE (ALTERED TO HUMIC COMPOUNDS) + NONFLUORESCENT STRUCTURED TRANSLUCENT MATERIAL

= COALY MATERIAL INCLUDING FUSINITE, SEMIFUSINITE, PSEUDOVITRINITE, MACRINITE, & INERTODETRINITE

= LOW / (LOW + HIGH)

LEGEND

CUTTINGS

CORE

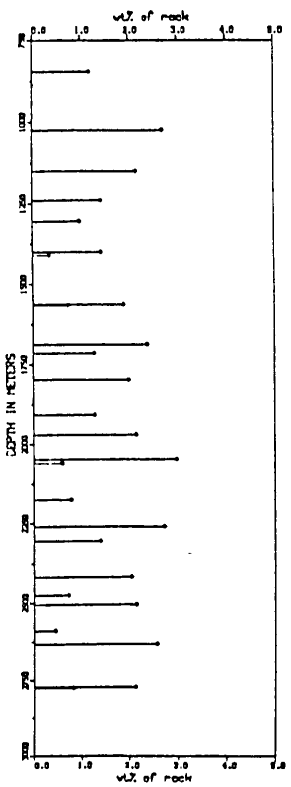
VERTICAL SCALE:
1 INCH = 125 METERS

DISCOVERY BAY #1, OFFSHORE VICTORIA, AUSTRALIA

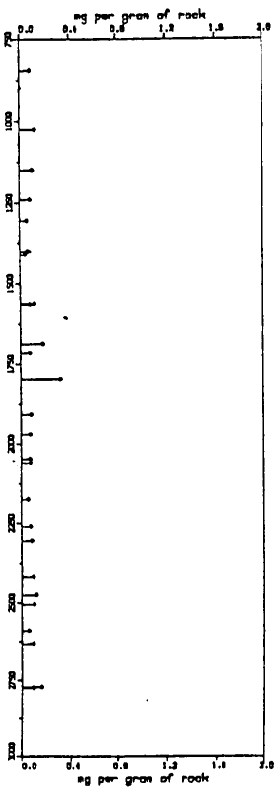
PYROLYSIS DATA

EPS REPORT = 2368L

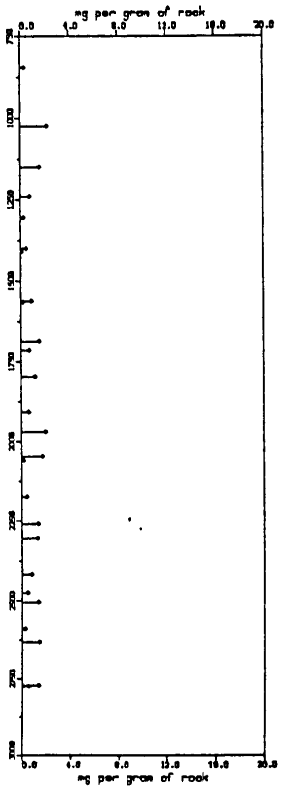
TOTAL ORGANIC CARBON (TOC)



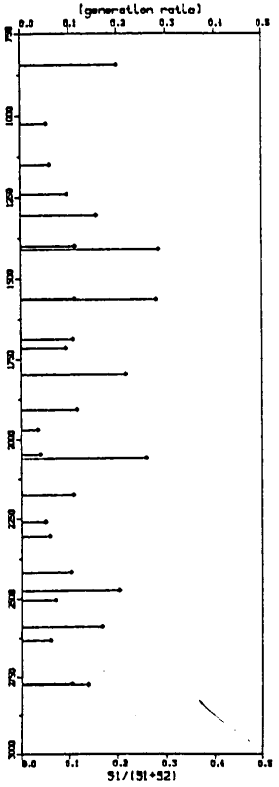
S1 PEAK (TEH)



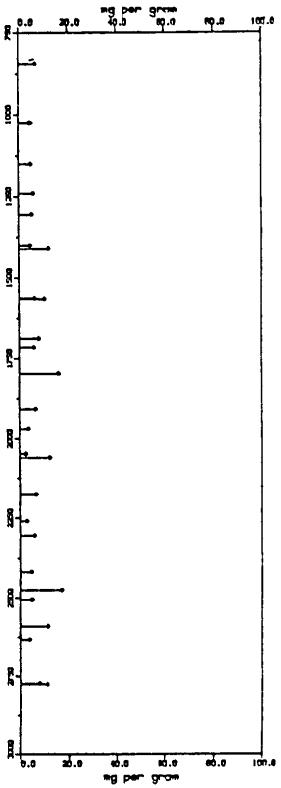
S2 PEAK



PRODUCTION INDEX



TEH/TOC



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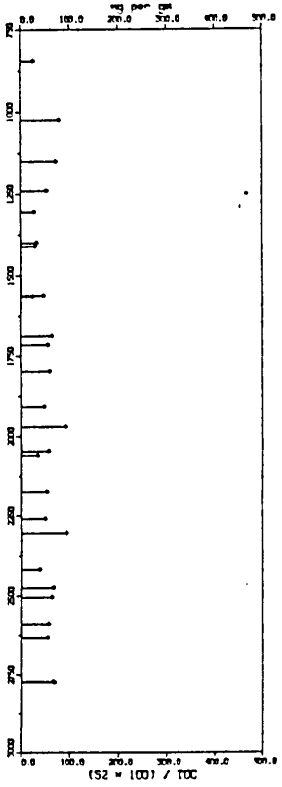
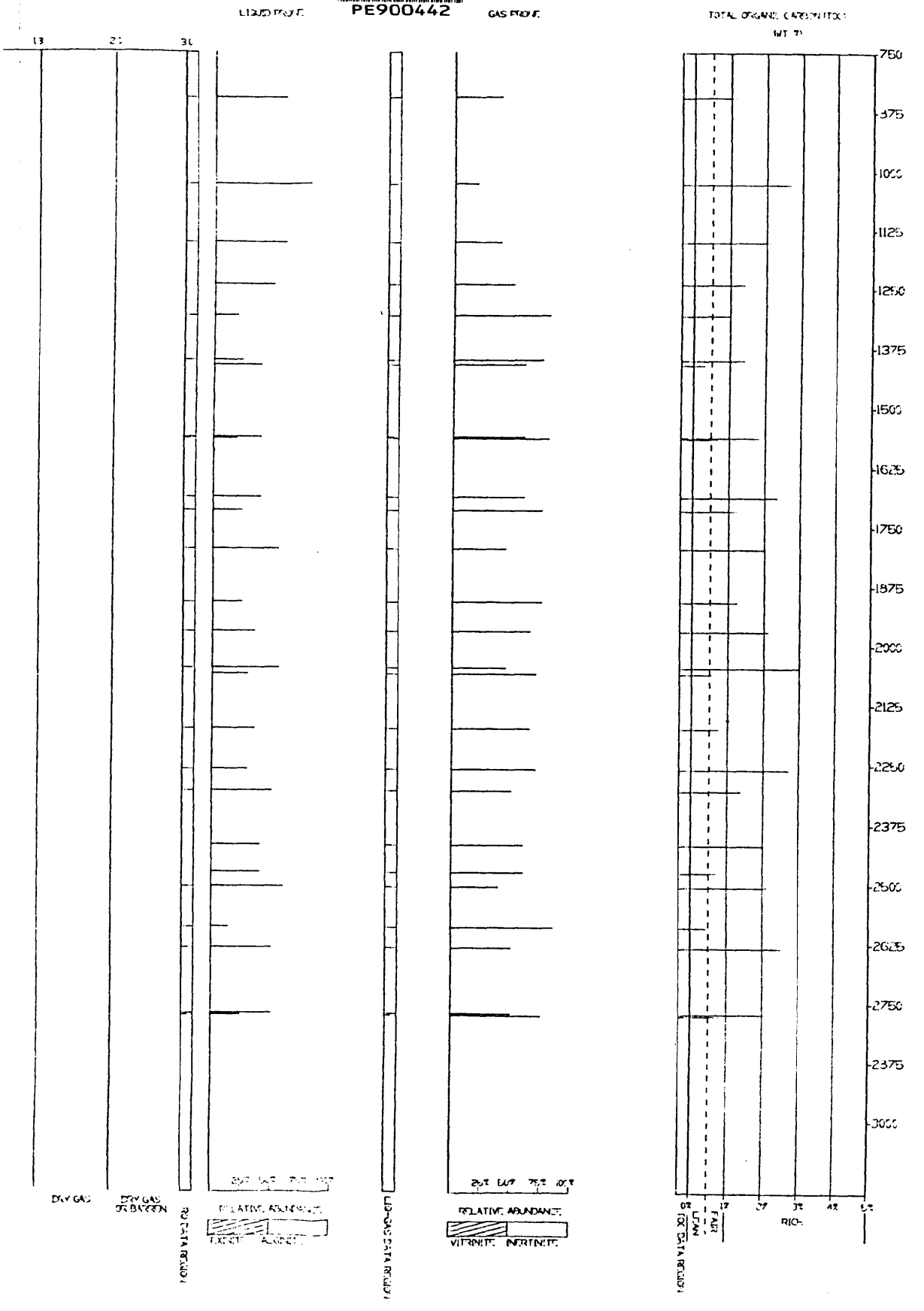
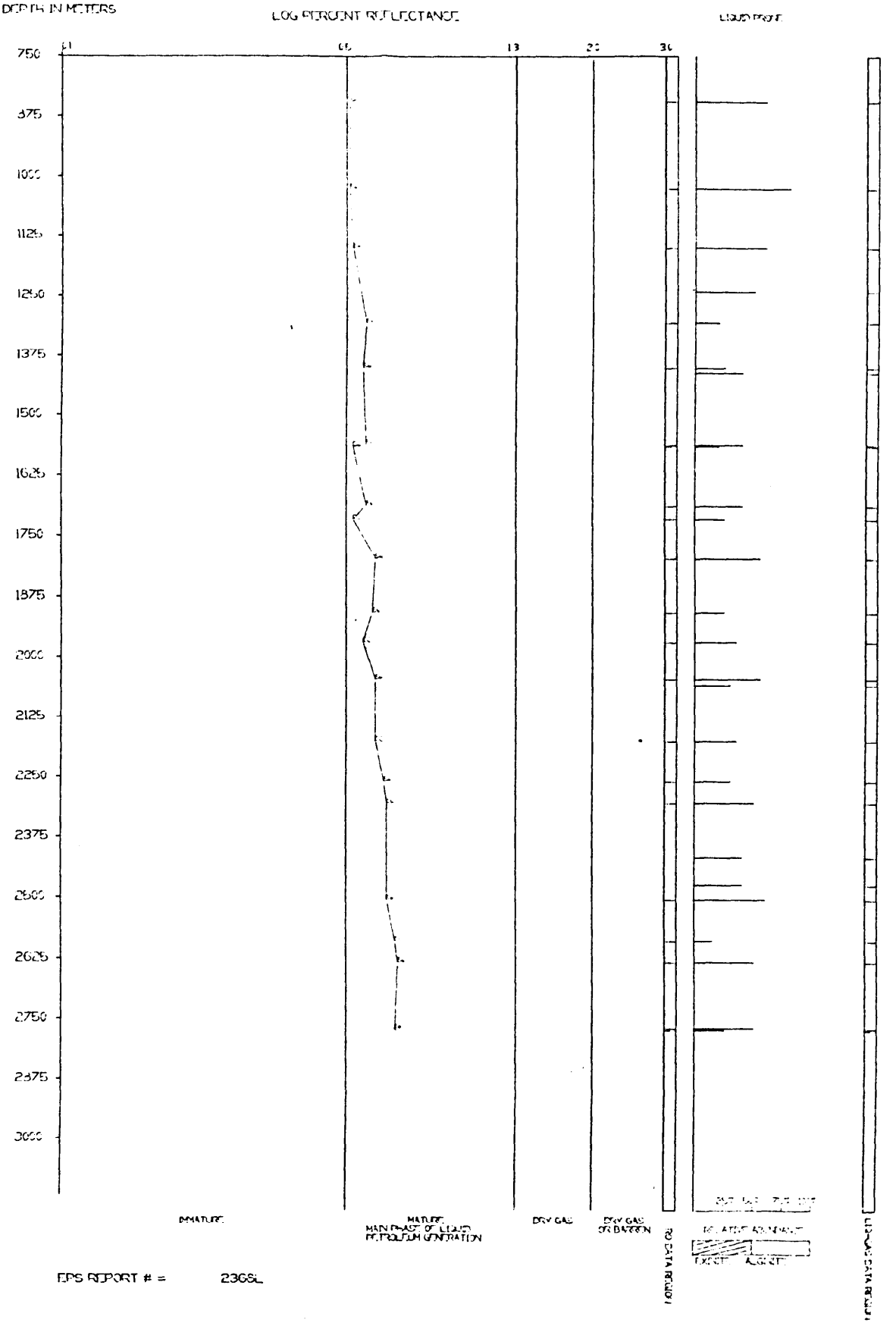


SOURCE ROCK POTENTIAL OF PPCO DISCOVERY BAY NO 1 OTWAY BASIN



THERMAL ALTERATION AND SOURCE ROCK POTENTIAL OF PPCO [



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