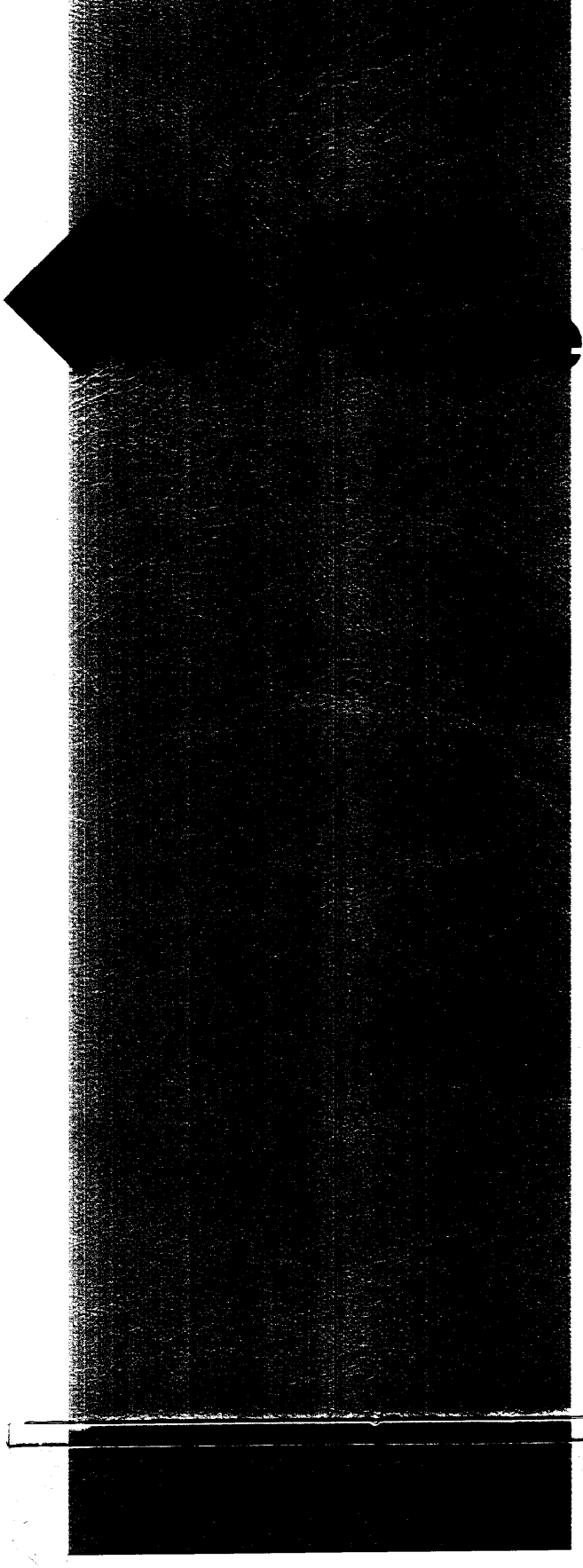

BHP

Australia Division
BHP Petroleum

ERIC THE RED-1, VIC/P31
WELL COMPLETION REPORT
INTERPRETIVE

OTWAY BASIN, VIC/P31

ERIC THE RED-1

WELL COMPLETION REPORT
INTERPRETATIVE VOLUME

PREPARED BY: D.H. Wong
Petroleum Geologist

70284_1.WCR

DATE: May 1994

BHP PETROLEUM PTY. LTD.
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ACKNOWLEDGMENT

This report was compiled and written with the help of the following:

1 Chris Luxton, Petroleum Geophysicist.
2 Simon Horan, Petroleum Geologist.
3 Mark Lemaire, Database Administrator.
4 Elise Smith, Technical Assistant.

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GEOCHEMICAL EVALUATION OF ERIC THE RED-1

OTWAY BASIN

OFFSHORE VICTORIA AUSTRALIA

PREPARED BY: J. PRESTON
SENIOR GEOCHEMIST

0508.rep

DATE: April, 1994

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1 INTRODUCTION

Following completion of the Eric the Red-1 well, a programme was undertaken to evaluate the source rock character and thermal maturity of the drilled sequence.

The evaluation of source rock character firstly involved analysis of seven sidewall cores for total organic carbon (TOC) content by Geotech, Perth. All the samples analysed, including two coals, yielded a TOC greater than 1.0%, and were accordingly pyrolysed by the Rock-Eval method.

In an attempt to evaluate the thermal maturity of the Eric the Red-1 section, vitrinite reflectance measurements were made on nine SWCs from the well.

Two SWCs were solvent-extracted in an attempt to establish the presence of residual hydrocarbons. One of the resulting extracts was analysed by the whole-extract GC method.

This report provides a compilation of the petroleum geochemistry data obtained from the Eric the Red-1 well, together with an interpretation of these data.

2 SOURCE ROCK CHARACTERISATION

2.1 Screening Analyses

2.1.1 Total Organic Carbon (TOC)

As indicated in Table 1, the seven samples analysed for total organic content (TOC) originated in the Late Cretaceous Sherbrook and Shipwreck Groups. Although 0.5% TOC is commonly used as the minimum requirement for a petroleum source rock, it is uncommon for sediments from the southern margin of Australia with less than 1.0% TOC to be significant petroleum sources. On the basis of seven samples, it is clear that the Late Cretaceous section in Eric the Red-1 contains potential petroleum source rocks, their TOC values ranging from 1.46-3.51% (Table 2, Figure 1 and Enclosure 1). Note that two samples from 1151m and 1275m consisted of coal (TOC=36.3-60.0%).

2.1.2 Rock-Eval Pyrolysis

All seven samples (in which the TOC was found to exceed 1.0%) were pyrolysed using the Rock-Eval method. Two of these samples, from 812.5-1010.0m, gave HI values of 64-73 and S1+S2 yields of 1-2 mg/g (Figures 2 and 3), indicating poor generative potential for gas. Three samples from 1316-1630m gave HI values of 111-140 and S1+S2 yields of 3-4 mg/g, indicating fair potential for gas, and perhaps some condensate. The data from the two coal samples (HI=130-224) suggest that there is greater potential for liquids generation in the coals.

It is clear from the S1+S2 yields of the Eric the Red-1 samples that expulsion, if any, would be possible only at relatively high levels of thermal maturity. At such levels of thermal maturity, considerable secondary cracking of liquids to gas would occur, such that these source rocks would perhaps be more "gas prone" than indicated by the source character data.

The Rock-Eval pyrolysis data listed in Table 2 are summarised in the form of crossplots in Figures 4 and 5. Figure 4 reflects the overall quality of the kerogen in the samples analysed, in terms of their oil-prone or gas-prone character: most samples plot in the gas/condensate-prone Type II/III and Type III areas of the diagram (HI < 150). (Note that the 1316m sample is omitted from this diagram due to its artifically high OI value.) The more liquids-prone character of one of the coal samples is reflected in its more obvious Type II affinity. Figure 5 reflects the generative capacity of the samples, in terms of their source quality and thermal maturity; none of the samples approach the threshold of significant hydrocarbon generation and expulsion, due to their poor quality and thermal immaturity.

Maceral petrography associated with the vitrinite reflectance determinations shows that the organic matter in most of the samples is dominated by inertinite, followed by vitrinite (Figure 6). However, liptinitic/exinitic (Type II) macerals are identified in all samples except the 1151m coal (described as 100% vitrinite), confirming the presence of some liquids-prone components. In the Shipwreck Group, the Type II macerals appear to be supplemented by small amounts of oil-prone alginitic (Type I) macerals.

2.2 Thermal Maturity

Rock-Eval parameters which are often used for maturity assessment are Tmax and Production Index (PI). A Tmax value of 435°C, and a PI value of 0.10, are regarded as marking the entrance to the oil-generative window.

As Table 2 and Figure 7 show, values of Tmax range from 408-436°C. Values of PI (Figure 8) are generally less than 0.10. There is therefore an agreement between the maturity estimates based on the PI and Tmax data in the Eric the Red-1 well, namely that the 812.5-1630m section is thermally immature.

Vitrinite reflectance measurements on nine samples from the 812.5-1630.0m interval do not exceed 0.51% (see Table 3/ 3A and Figures 9 and 10). The value for one sample in the Otway Group (at 1831.5m) is 0.68%. The Late Cretaceous interval in Eric the Red-1 can therefore be considered to be thermally immature, and the Otway Group at T.D. marginally mature.

Because kerogens will generate products with markedly different compositions as thermal maturity progresses, it follows that certain analyses and the interpretation of their results will be fundamentally affected by maturity, in particular Rock-Eval pyrolysis data. The observation that the drilled interval has not attained thermal maturity means that this need not be a consideration in the interpretation of geochemical data from the Eric the Red-1 well. The poor source quality of parts of the drilled sequence cannot therefore be attributed to advanced thermal maturity.

3 FLUIDS CHARACTERISATION

3.1 Whole-Extract GC Analysis

Two SWC samples, from 1097m and 1340m, were solvent-extracted in an attempt to establish the presence of residual hydrocarbons. The resulting extract yields are listed in Table 4, and summarised in Figure 11. The 1097m extract was analysed by the whole-extract GC method, the GC trace being shown in Figure 12.

As Figure 11 shows, the extract yields ranged from 223-690 ppm. These results, combined with the character of the 1097m whole-extract GC trace, suggest that the extracts are unlikely to represent residual saturations of mature migrated hydrocarbons, but instead appear to represent small amounts of indigenous, or very locally migrated, immature hydrocarbons. No n-alkane distribution data are reported.

4 CONCLUSIONS

Seven SWC samples, from the Late Cretaceous Sherbrook and Shipwreck Groups, were analysed for their TOC content. All these samples, including two coals, yielded values greater than 1.0%, and were accordingly analysed by Rock-Eval pyrolysis. The resulting data revealed a predominance of mainly gas-prone Type II/III to Type III organic matter with HI values less than 150, with the exception of one coal sample (1275m) characterised by a more liquids-prone organic facies. Liptinitic/exinitic (Type II) macerals were identified in most samples (supplemented by a sparse alginitic component in the Shipwreck Group), suggesting minor liquids potential. However, it is clear from the S1+S2 yields that expulsion from these source rocks would be possible only at relatively advanced levels of thermal maturity; at such levels, secondary cracking of liquids to gas would occur, such that these source rocks would become more gas-prone than indicated by the source character data.

Thermal maturity data, namely Tmax, PI and vitrinite reflectance measurements, suggest that the Sherbrook Group and Shipwreck Group are thermally immature, but that the Otway Group is marginally mature at TD. The generative potential of the source rocks discussed above has therefore not been realised at the Eric the Red-1 location. A further inference is that the quality of these source rocks can in no way be linked to advanced maturity, their relative leanness being more a function of the type and preservation state of their contained organic matter.

Two SWC samples were solvent-extracted in an attempt to identify any residual hydrocarbons (namely, any hydrocarbons which represent the remains of an earlier liquids saturation). The resulting extract yields were low (less than 700ppm). One extract (1097m) was analysed by the whole-extract GC method, and the nature of the GC trace, taken together with the low extract yield, did not suggest that the extracts represented residual hydrocarbons.

TABLE 1

GEOLOGIC & GENERAL DATA - SEDIMENTS

WELL NAME = ERIC THE RED-1
COUNTRY = Australia
BASIN = Otway

DEPTH 1	DEPTH 2	GEOLOGIC PERIOD/EPOCH	GEOLOGIC AGE	FORMATION	PRIMARY LITHOLOGY	PERCENT PRIMARY	SECONDARY LITHOLOGY	PERCENT SECONDARY	SAMPLE TYPE	SAMPL QUALI
812.50	812.50	L.CRET	-	SHERGP	-	-	-	-	SWC	-
1010.00	1010.00	L.CRET	-	SHERGP	-	-	-	-	SWC	-
1097.00	1097.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1151.00	1151.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1275.00	1275.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1316.00	1316.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1340.00	1340.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1455.00	1455.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1575.00	1575.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1630.00	1630.00	L.CRET	-	SHIPGP	-	-	-	-	SWC	-
1831.50	1831.50	E.CRET	-	OTWAGP	-	-	-	-	SWC	-

N.B. Code definitions at end of table
- = No data

CODE DEFINITIONS FOR TABLE 1

ERIOD CODES

etaceous
taceous

GEOLOGICAL AGE CODES

FORMATION CODES

OTWAGP = Otway Group
SHERGP = Sherbrook Group
SHIPGP = Shipwreck Group

PRIMARY/SECONDARY LITHOLOGY CODES

SAMPLE TYPE CODES

SWC = Sidewall Core

SAMPLE QUALITY CODES

CONTRACTOR CODES

GTS = Geotechnical Servics

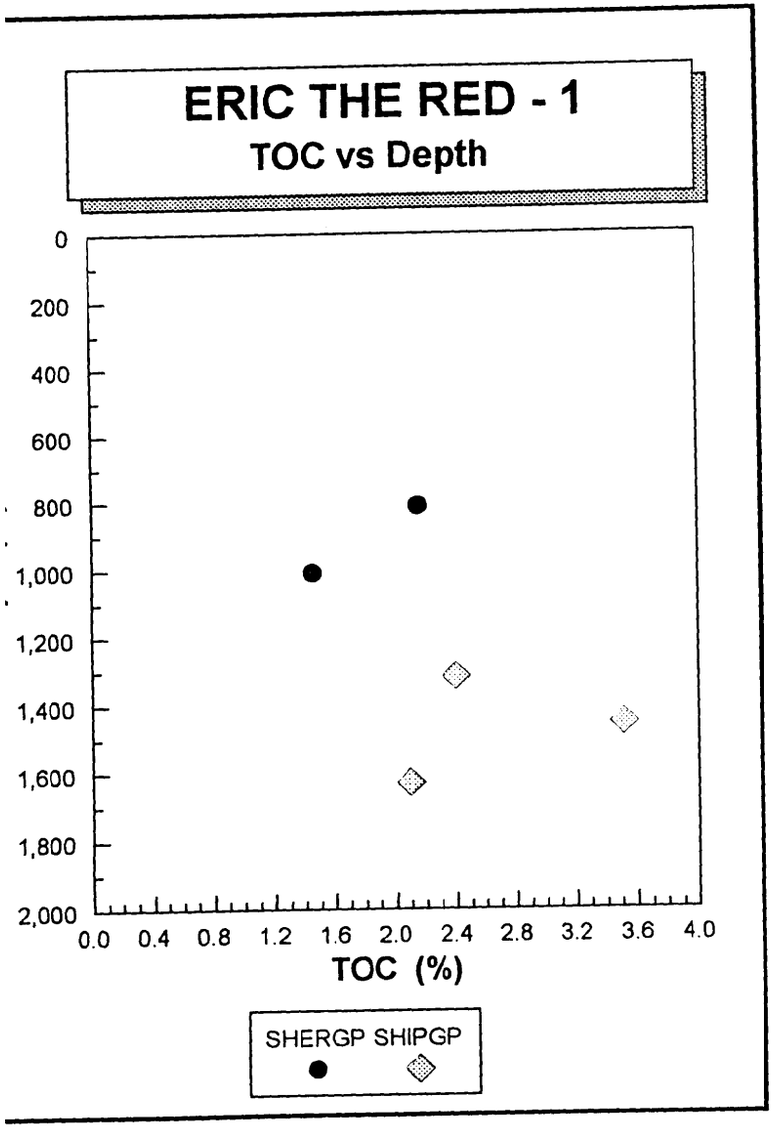
TABLE 2

TOC AND ROCK-EVAL PYROLYSIS DATA - SEDIMENTS

WELL NAME = ERIC THE RED-1
COUNTRY = Australia
BASIN = Otway

DEPTH 1	DEPTH 2	TOC	TMAX	S0	S1	S2	S3	S1+S2	S2/S3	PI	PC	HI	OI
812.50	812.50	2.16	432	-	.19	1.57	.72	1.76	2.18	.11	.15	73	3
1010.00	1010.00	1.46	435	-	.03	.94	.71	.97	1.32	.03	.08	64	4
1151.00	1151.00	36.30	408	-	4.92	47.12	7.48	52.04	6.30	.09	4.32	130	2
1275.00	1275.00	60.00	422	-	5.25	134.44	6.46	139.69	20.81	.04	11.59	224	1
1316.00	1316.00	2.40	426	-	.17	3.27	12.21	3.44	.27	.05	.29	136	50
1455.00	1455.00	3.51	431	-	.14	3.88	8.04	4.02	.48	.03	.33	111	22
1630.00	1630.00	2.10	436	-	.29	2.94	.39	3.23	7.54	.09	.27	140	1

TOC = Total organic carbon
S2 = HC generating potential
HI = Hydrogen index
TMAX = Max. temperature S2
S3 = Organic carbon dioxide
OI = Oxygen index
S0 = Volatile gaseous HC's
PI = Production index
- = no data


ERIC THE RED - 1
TOC vs Depth
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
0.0 0.4 0.8 1.2 1.6 2.0 2.4 2.8 3.2 3.6 4.0
TOC (%)
SHERGP SHIPGP

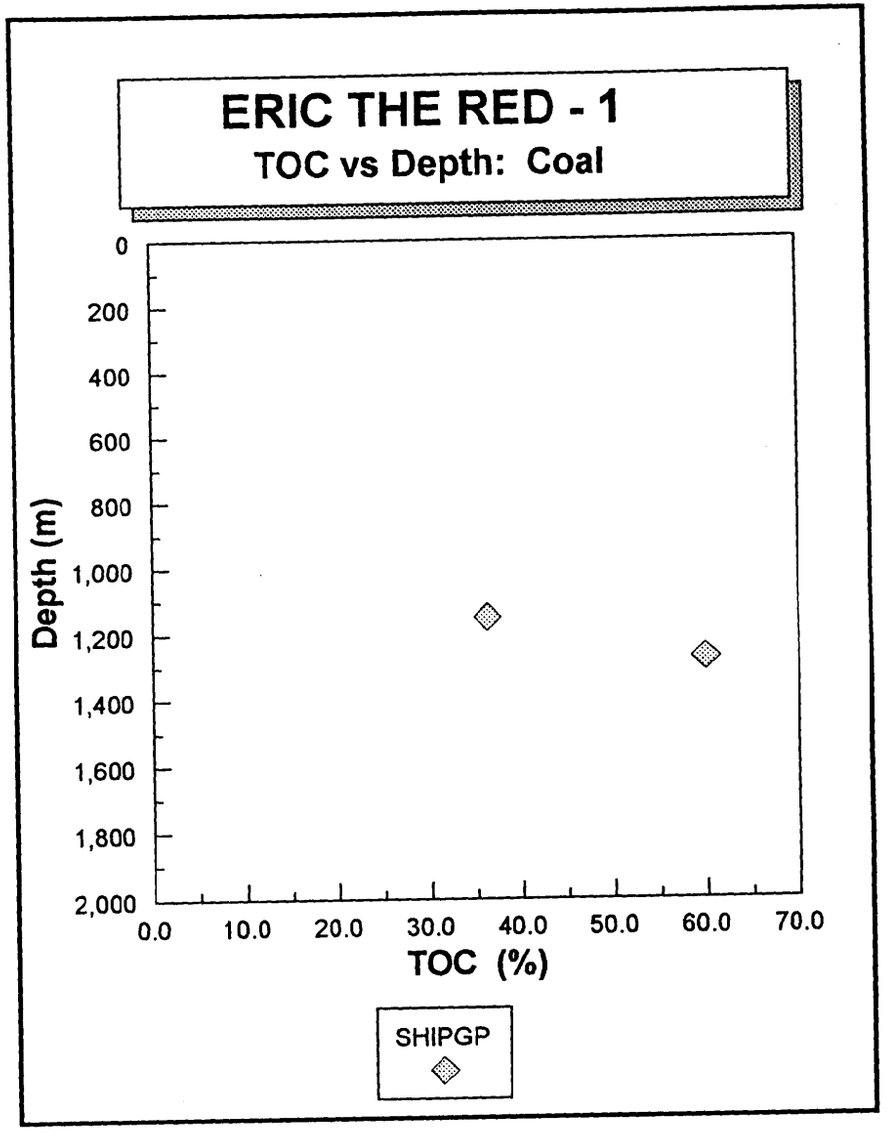

ERIC THE RED - 1
TOC vs Depth: Coal
Depth (m)
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0
TOC (%)
SHIPGP

Figure 1

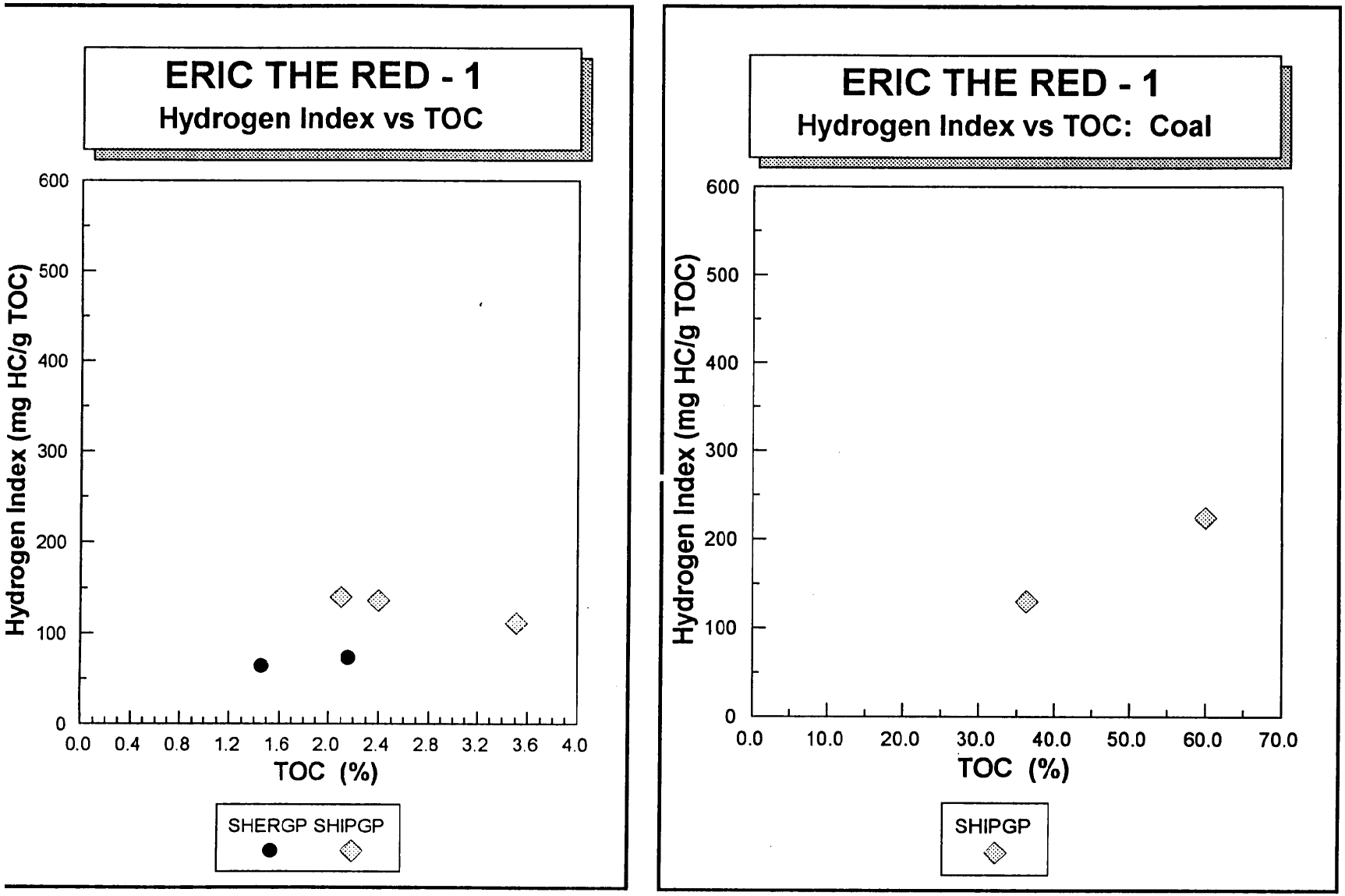
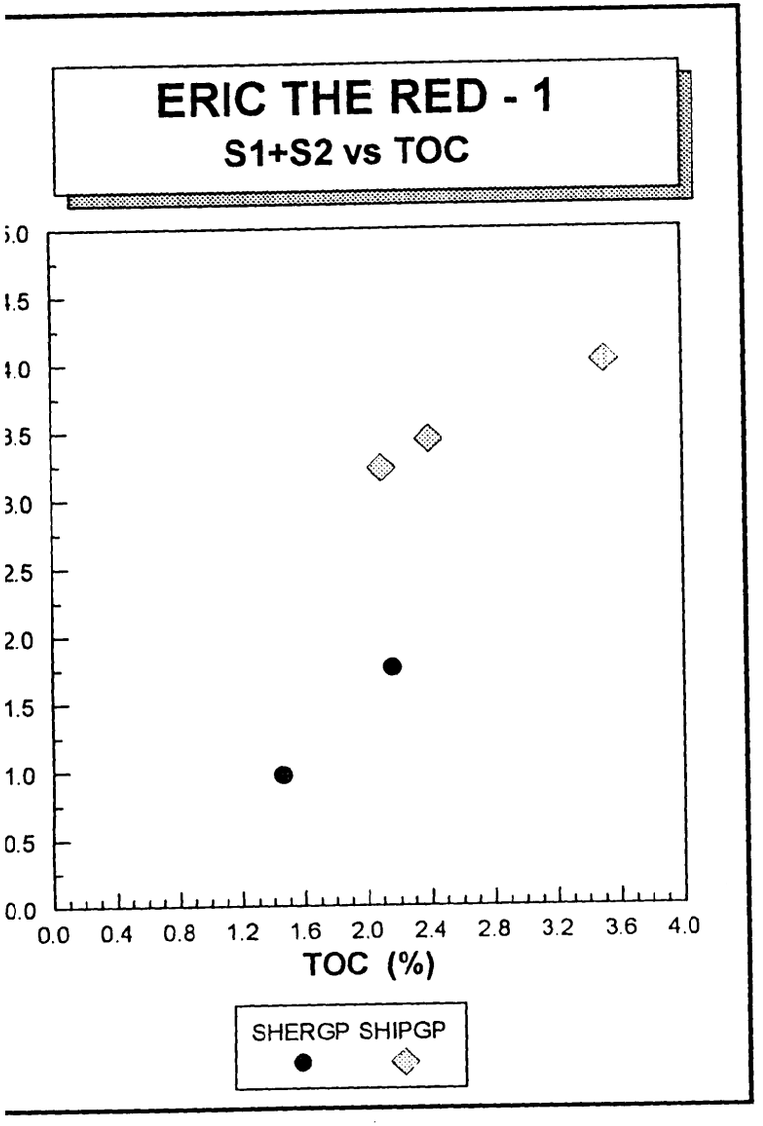

ERIC THE RED - 1
Hydrogen Index vs TOC
Hydrogen Index (mg HC/g TOC)
600
500
400
300
200
100
0
0.0 0.4 0.8 1.2 1.6 2.0 2.4 2.8 3.2 3.6 4.0
TOC (%)
SHERGP SHIPGP
ERIC THE RED - 1
Hydrogen Index vs TOC: Coal
Hydrogen Index (mg HC/g TOC)
600
500
400
300
200
100
0
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0
TOC (%)
SHIPGP

Figure 2


ERIC THE RED - 1
S1+S2 vs TOC
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0 0.4 0.8 1.2 1.6 2.0 2.4 2.8 3.2 3.6 4.0
TOC (%)
SHERGP SHIPGP

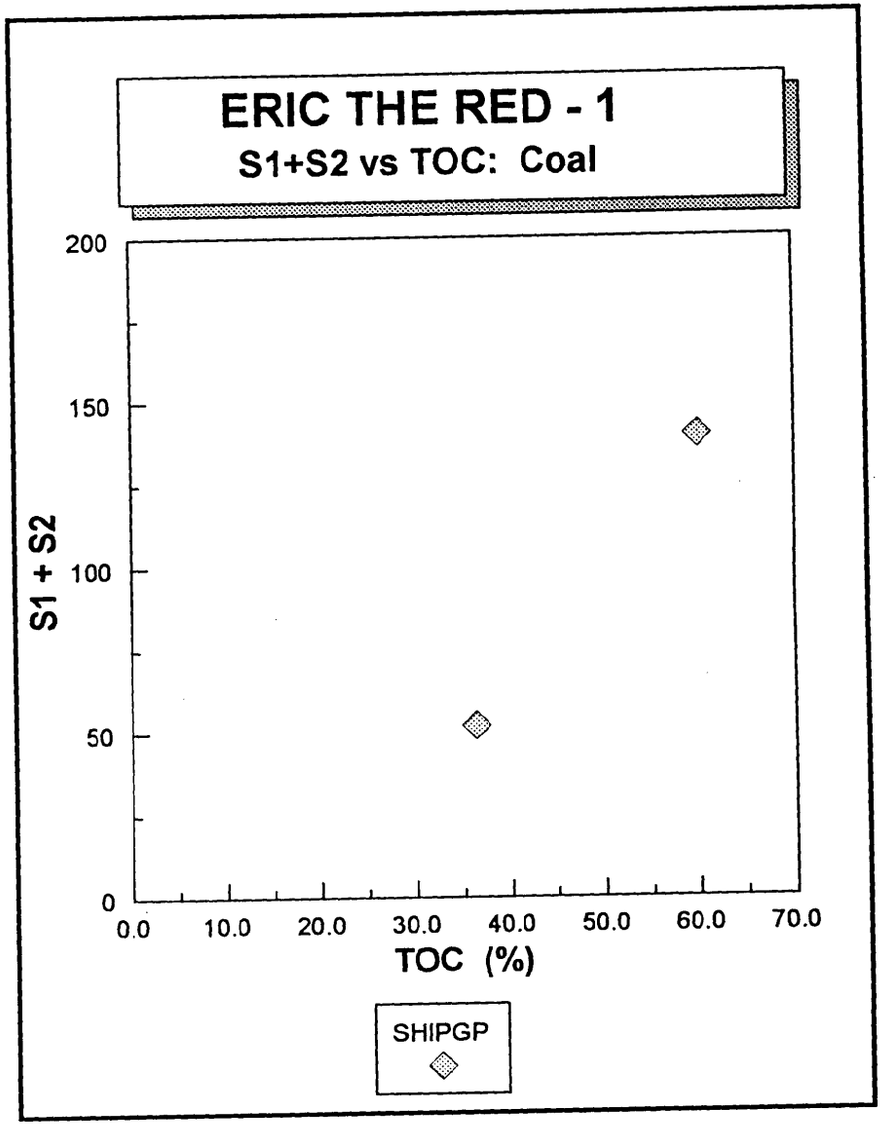

ERIC THE RED - 1
S1+S2 vs TOC: Coal
200
150
100
50
0
S1 + S2
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0
TOC (%)
SHIPGP

Figure 3

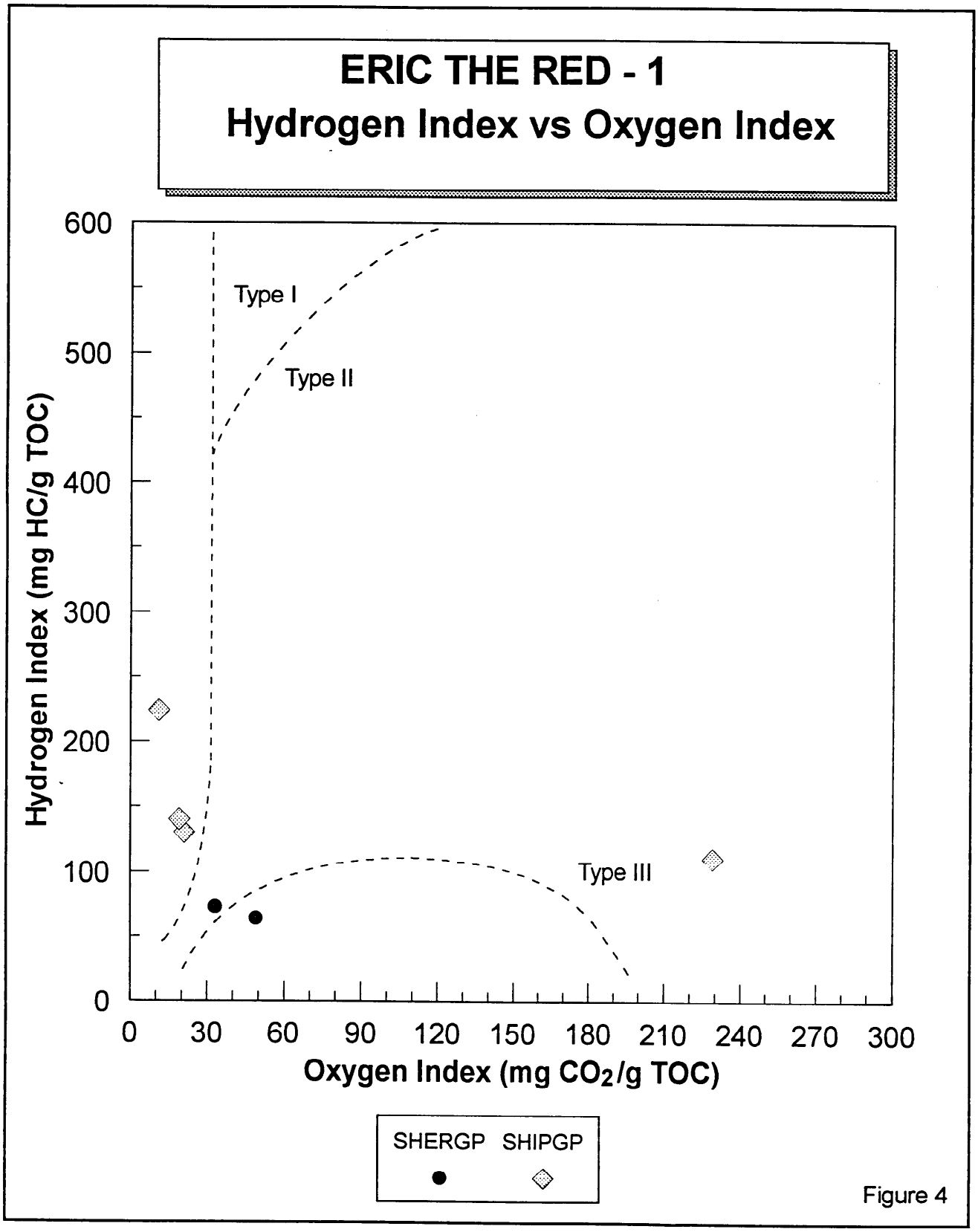

ERIC THE RED - 1
Hydrogen Index vs Oxygen Index
Hydrogen Index (mg HC/g TOC)
600
500
400
300
200
100
0
Type I
Type II
Type III
0
30
60
90
120
150
180
210
240
270
300
Oxygen Index (mg CO2/g TOC)
SHERGP
SHIPGP

Figure 4

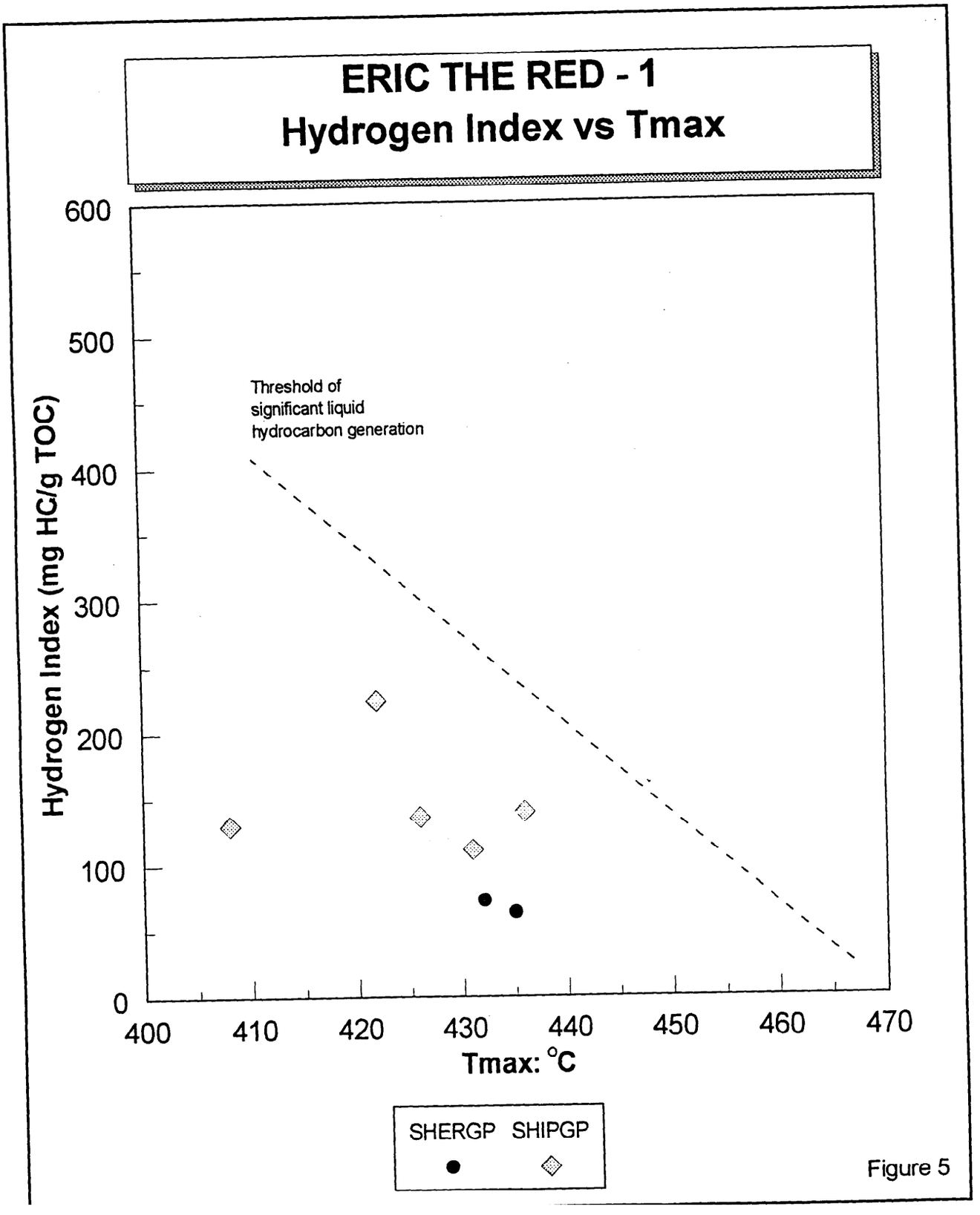

ERIC THE RED - 1
Hydrogen Index vs Tmax
Hydrogen Index (mg HC/g TOC)
600
500
400
300
200
100
0
Threshold of
significant liquid
hydrocarbon generation
400
410
420
430
440
450
460
470
Tmax: °C
SHERGP
SHIPGP

Figure 5

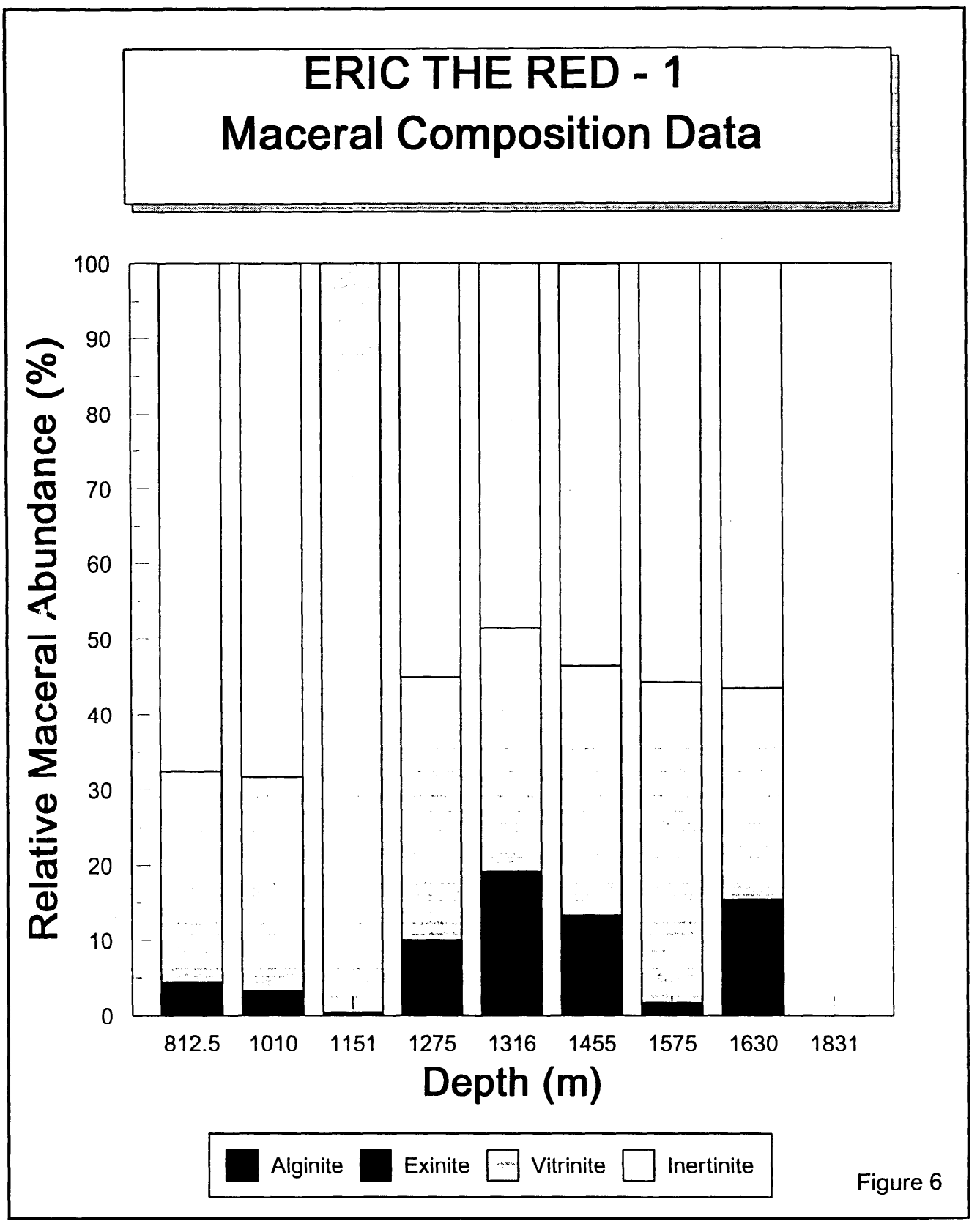

ERIC THE RED - 1
Maceral Composition Data
Relative Maceral Abundance (%)
100
90
80
70
60
50
40
30
20
10
0
812.5
1010
1151
1275
1316
1455
1575
1630
1831
Depth (m)
Alginite
Exinite
Vitrinite
Inertinite

Figure 6

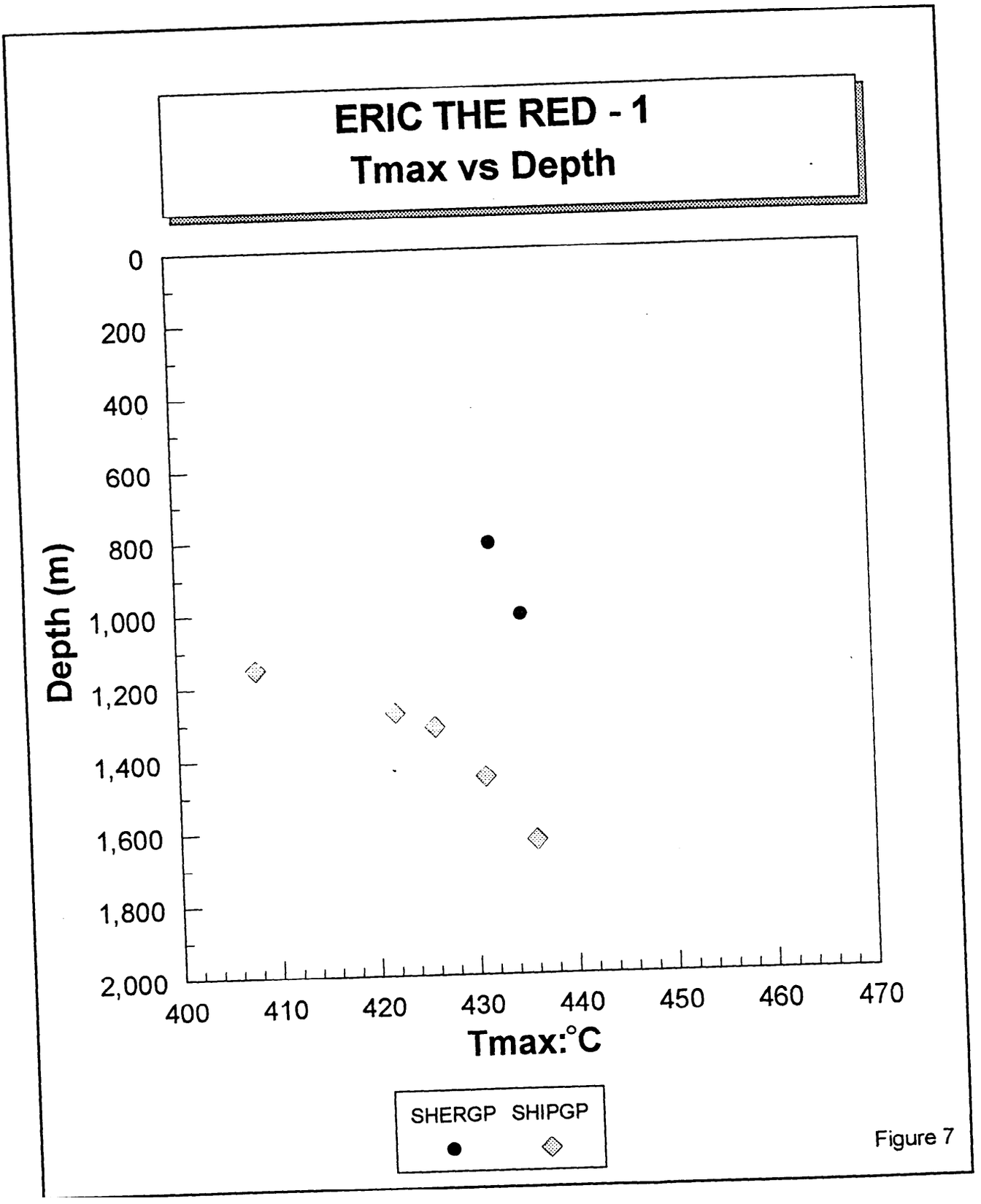

ERIC THE RED - 1
Tmax vs Depth
Depth (m)
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
400
410
420
430
440
450
460
470
Tmax:°C
SHERGP
SHIPGP

Figure 7

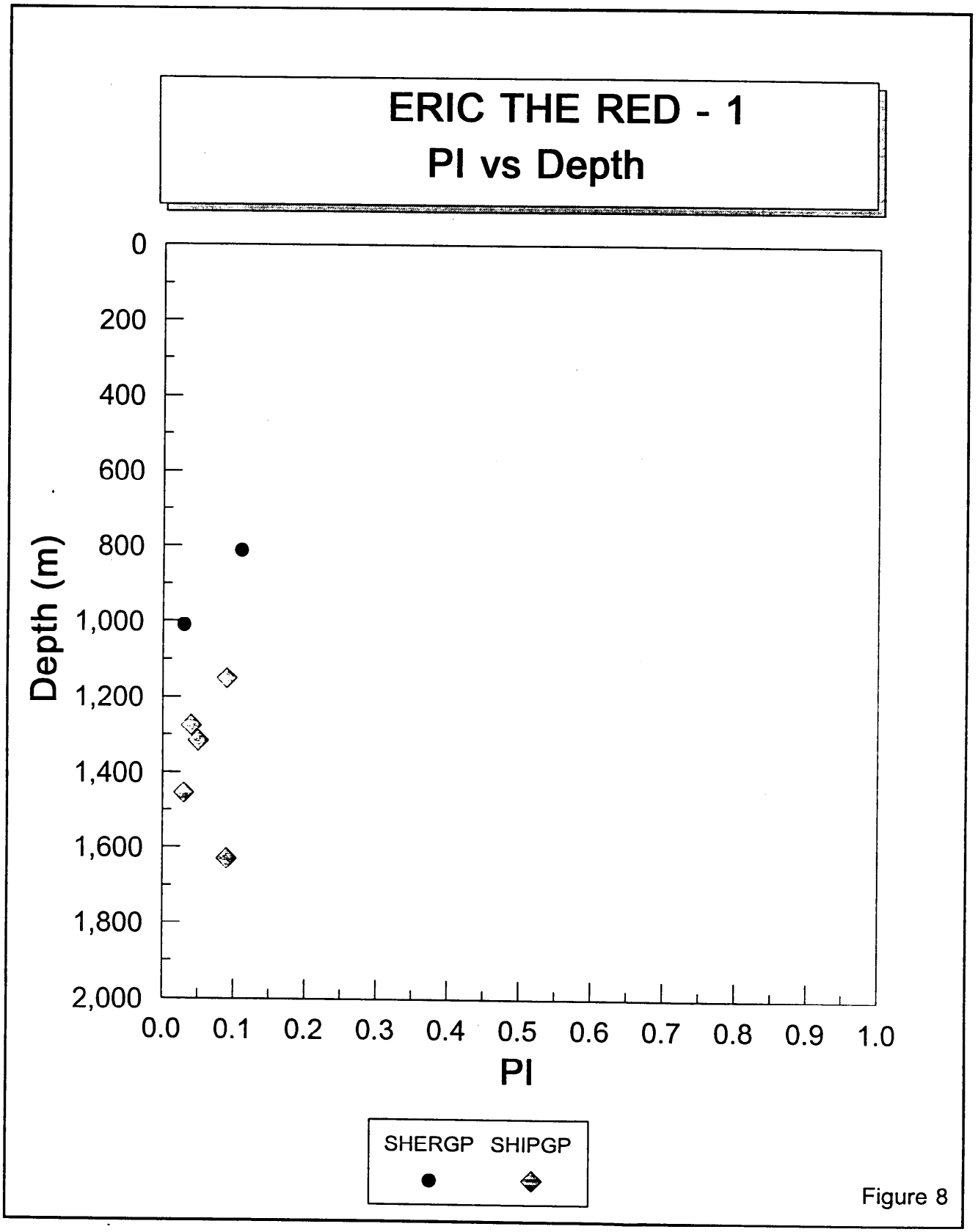

ERIC THE RED - 1
PI vs Depth
Depth (m)
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
PI
SHERGP
SHIPGP

Figure 8

TABLE 3

VITRINITE REFLECTANCE AND COAL MACERAL DATA - SEDIMENTS
ALL MACERAL POPULATIONS

WELL NAME = ERIC THE RED-1
COUNTRY = Australia
BASIN = Otway

DEPTH 1	DEPTH 2	POPULATION TYPE	MEAN % REFL.	MINIMUM % REFL.	MAXIMUM % REFL.	NUMBER READINGS	STANDARD DEVIATION	MACERAL % ALGINITE	MACERAL % EXINITI
812.50	812.50	V	.43	.36	.51	27	.04	0.00	4.50
1010.00	1010.00	V	.45	.36	.53	26	.05	0.00	3.40
1151.00	1151.00	V	.40	.37	.43	26	.02	0.00	.50
1275.00	1275.00	V	.39	.35	.42	26	.02	0.00	10.10
1316.00	1316.00	V	.46	.34	.62	32	.07	4.80	14.50
		R	.70	.65	.74	3	.05		
1455.00	1455.00	V	.49	.42	.63	26	.05	1.30	12.00
1575.00	1575.00	V	.47	.37	.61	27	.07	0.00	1.70
		R	.65	.63	.66	3	.02		
1630.00	1630.00	V	.51	.41	.65	25	.07	0.00	15.50
1831.50	1831.50	V	.68	.68	.68	1	0.00	-	-

N.B. Code definitions at end of table
- = no data

CODE DEFINITIONS FOR TABLE 3

POPULATION TYPE CODES

R = REWORKED
V = VITRINITE

CONTRACTOR CODES

GTS = Geotechnical Servics

JOB 1940A, ERIC THE RED-1, OTWAY BASIN

Sample No(s)	Depth(m)/ Sample type	$\bar{R}_v$ max (%)	Range (%)	N	Description Including Liptinite Fluorescence Characteristics
v7788	812.5 SWC-8	0.43	0.36-0.51	27	Sparse cutinite, sporinite and liptodetrinite, yellow to orange, rare resinite, yellow to orange, rare suberinite, orange to dull orange. (Siltstone>>coal. Coal rare, V>I. Vitrite>inertite. Dom abundant, I>V>L. Inertinite and vitrinite abundant, liptinite sparse. Oil drops rare, yellow. Mineral fluorescence pervasive, weak orange to weak dull orange. Iron oxides sparse. Pyrite abundant.)
v7789	1010.0 SWC-1	0.45	0.36-0.53	26	Sparse resinite, yellow to orange, rare cutinite and sporinite, yellow to orange, rare suberinite, orange to dull orange. (Siltstone>>coal. Coal rare, V>I. Vitrite>inertite. Dom abundant, I>V>L. Inertinite and vitrinite abundant, liptinite sparse. Oil drops rare, yellow. Mineral fluorescence pervasive, weak orange to weak dull orange. Iron oxides sparse. Pyrite abundant.)
v7790	1151.0 SWC-80	0.40	0.37-0.43	26	Sparse resinite, yellow to orange, rare cutinite and sporinite, yellow to orange. (Coal. Coal dominant, V>>L. Vitrite>>clarite. Texto-ulminite is the main vitrinite maceral. Mineral-free maceral group composition of the coal: vitrinite - 99.5%, inertinite - absent, liptinite - 0.5%. Pyrite abundant.)
v7791	1275.0 SWC-72	0.39	0.35-0.42	26	Abundant sporinite, yellow to orange, sparse resinite and liptodetrinite, yellow to orange, sparse cutinite, orange, rare suberinite, orange to dull orange. (Coal. Coal dominant, I>V>L. Clarodurite>duroclarite>inertite>vitrinertite>vitrite. Desmocollinite>telocollinite. Mineral-free maceral group composition of the coal: vitrinite - 35.0%, inertinite - 55.0%, liptinite - 10.0%. Pyrite common.)
v7792	1316 SWC-67	0.48 *Reworked	0.34-0.62 0.65-0.74	32 3	Sparse cutinite, lamalginite, liptodetrinite and resinite, yellow to orange, rare sporinite, yellow to orange. (Calcareous siltstone>carbonate. Dom abundant, I>V>L. Inertinite abundant, vitrinite and liptinite common. Reworked vitrinite sparse, $\bar{R}_v$ max = 0.65% to 0.74%. Oil drops rare, green. Mineral fluorescence pervasive, moderate green to yellowish green. Iron oxides sparse. Pyrite abundant.)
v7793	1455 SWC-55	0.49	0.42-0.63	26	Sparse cutinite, sporinite, liptodetrinite and lamalginite, yellow to orange, rare resinite, yellow to orange. (Clayey siltstone>carbonate>shaly coal>coal. Coal rare, V>>L>I. Vitrite. Shaly coal rare, V>>L>I. Vitrite>clarite. Dom abundant, I>V>L. Inertinite and vitrinite abundant, liptinite common. Bitumen rare, greenish yellow. Mineral fluorescence pervasive, weak moderate green to weak orange. Iron oxides sparse. Glauconite sparse. Pyrite common.)

TABLE 3A

JOB 1940A, ERIC THE RED-1, OTWAY BASIN

Sample No(s)	Depth(m)/ Sample type	$\bar{R}_v$ max (%)	Range (%)	N	Description Including Liptinite Fluorescence Characteristics
v7794	1575 SWC-49	0.49 *Reworked	0.37-0.61 0.63-0.66	27 3	Sparse cutinite, yellow to orange, rare sporinite and resinite, yellow to orange. (Sandstone>>shaly coal>coal. Coal abundant, vitrite>duroclarite>vitrinertite>inertite. Mineral-free maceral group composition of the coal: vitrinite - 48%, inertinite - 47%, liptinite - 5%. Dom abundant, I>V>>L. Inertinite abundant, vitrinite common, liptinite rare. Reworked vitrinite sparse $R_v$max = 0.63% to 0.66%. Mineral fluorescence pervasive, moderate green to moderate yellow. Iron oxides sparse. Pyrite sparse.)
v7795	1630 SWC-45	0.51	0.41-0.65	25	Sparse cutinite and sporinite, yellow to orange, sparse, resinite, lamalginite and liptodetrinite, yellow to dull orange. (Calcareous siltstone>carbonate. Dom abundant, I>V>L. Inertinite abundant, vitrinite and liptinite common. Mineral fluorescence patchy, moderate green. Iron oxides sparse. Pyrite common.)
v7796	1831.5 SWC-31	0.68	-	1	Rare lamalginite, yellow. (Sandstone>>carbonate. Dom rare, I>V=L. All maceral groups rare. Mineral fluorescence rare, very weak green. Iron oxides sparse. Pyrite rare.)

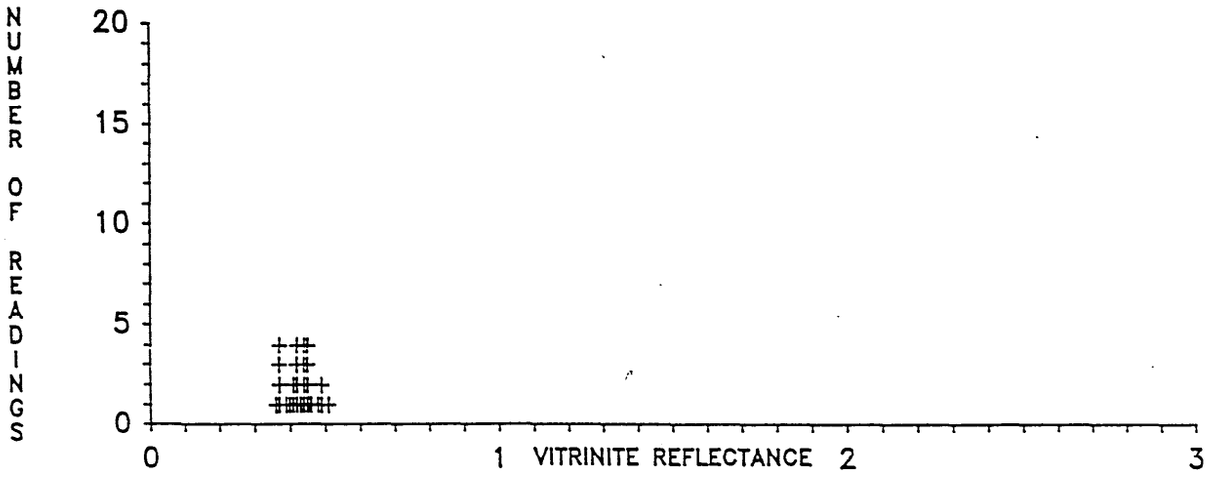
FIGURE 9

VITRINITE REFLECTANCE AND COAL MACERAL INDENTIFICATION

WELL: ERIC THE RED-1 CLIENT: BHP PETROLEUM SAMPLE TYPE: SWC
SAMPLE ID: 812.5 METRES DATE: MAY 1993

(Total No. of Readings=27) 0.36 0.37 0.37 0.37 0.37 0.39 0.40 0.41 0.41 0.42 0.42 0.42 0.42 0.43 0.44 0.44 0.44 0.44 0.45 0.45 0.45 0.45 0.46 0.48 0.49 0.49 0.51

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	27	0.43	0.36	0.51	0.04	INDIGENOUS(+)	28.10	67.40	4.50	0.00



SAMPLE ID: 1010.0 METRES SAMPLE TYPE: SWC

(Total No. of Readings=26) 0.36 0.37 0.37 0.40 0.40 0.40 0.41 0.42 0.43 0.43 0.44 0.45 0.45 0.45 0.46 0.47 0.47 0.47 0.48 0.48 0.49 0.49 0.50 0.50 0.52 0.53

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	26	0.45	0.36	0.53	0.05	INDIGENOUS(+)	28.40	68.20	3.40	0.00

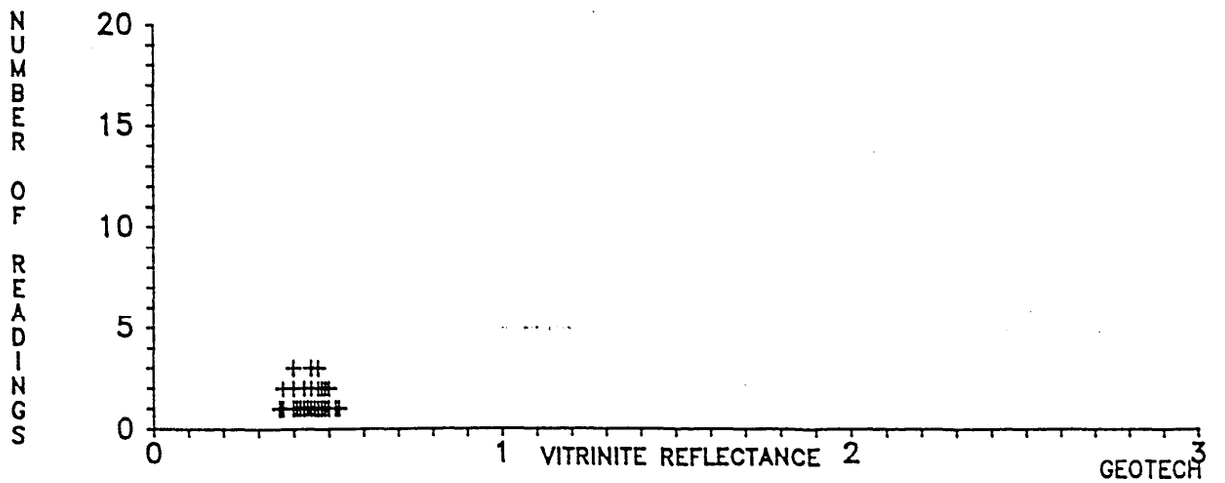


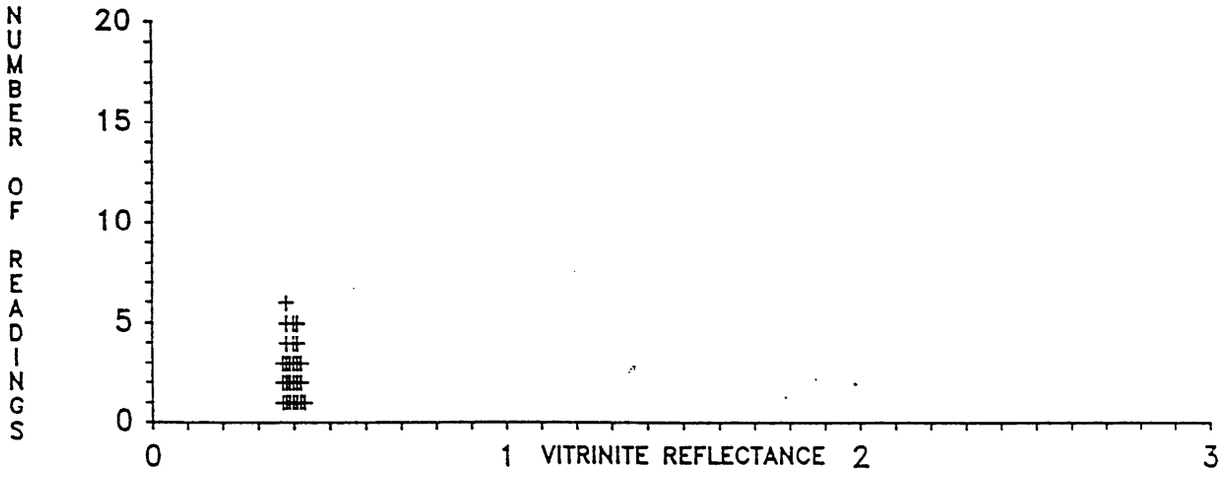
FIGURE 9 (cont'd)

VITRINITE REFLECTANCE AND COAL MACERAL INDENTIFICATION

WELL: ERIC THE RED-1 CLIENT: BHP PETROLEUM SAMPLE TYPE: SWC
SAMPLE ID: 1151.0 METRES DATE: MAY 1993

(Total No. of Readings=26) 0.37 0.37 0.37 0.38 0.38 0.38 0.38 0.38 0.38 0.39 0.39 0.39 0.40 0.40 0.40 0.40 0.40 0.41 0.41 0.41 0.41 0.41 0.41 0.42 0.42 0.42 0.43

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	26	0.40	0.37	0.43	0.02	INDIGENOUS(+)	99.50	0.00	0.50	0.00



SAMPLE ID: 1275.0 METRES SAMPLE TYPE: SWC

(Total No. of Readings=26) 0.35 0.35 0.36 0.37 0.37 0.37 0.37 0.38 0.38 0.38 0.39 0.39 0.39 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.41 0.41 0.42

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	26	0.39	0.35	0.42	0.02	INDIGENOUS(+)	35.00	55.00	10.00	0.00

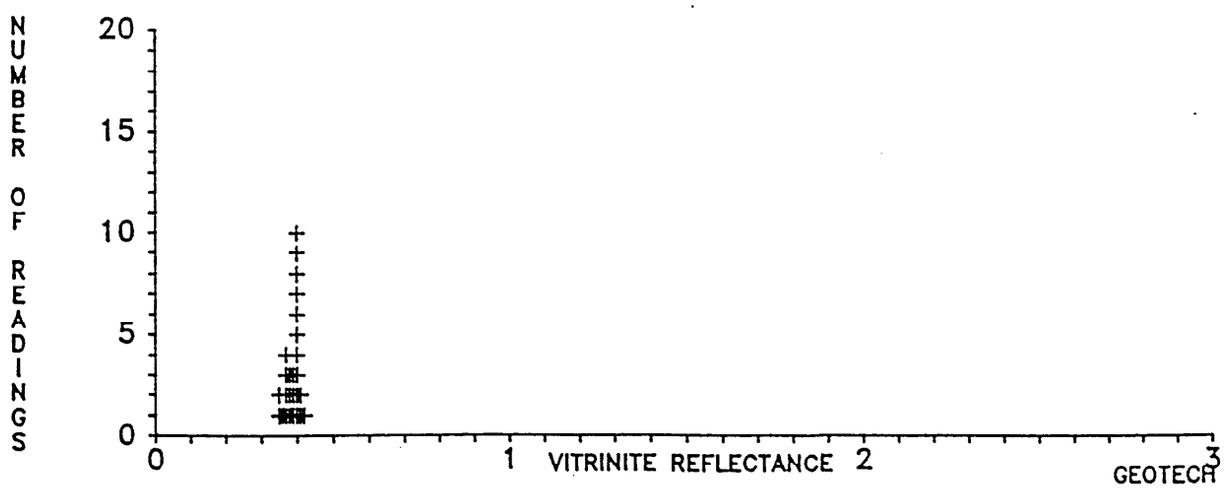


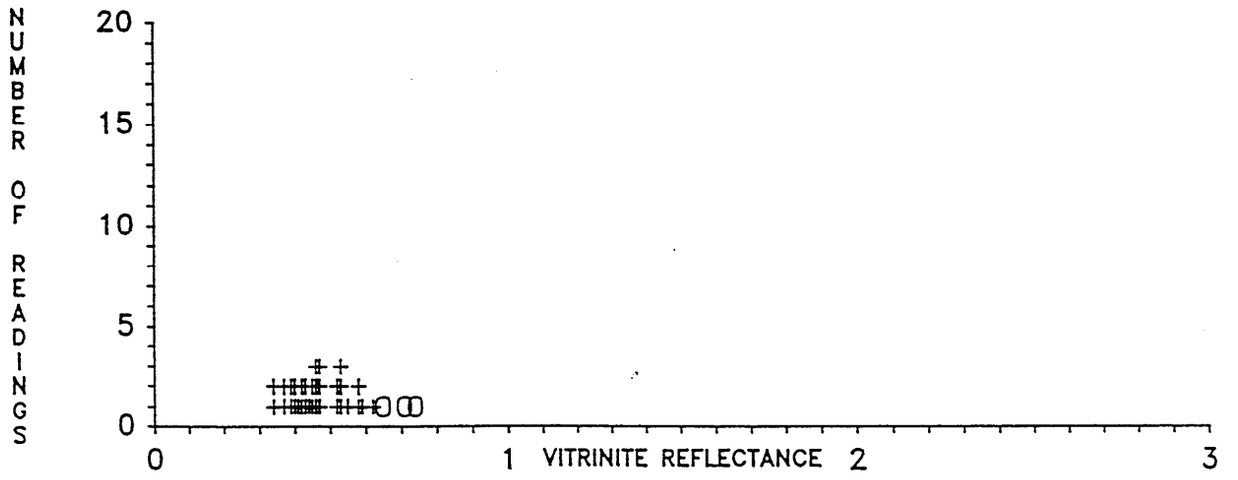
FIGURE 9 (cont'd)

VITRINITE REFLECTANCE AND COAL MACERAL INDENTIFICATION

WELL: ERIC THE RED-1 CLIENT: BHP PETROLEUM SAMPLE TYPE: SWC
SAMPLE ID: 1316.0 METRES DATE: MAY 1993

(Total No. of Readings=35) 0.34 0.34 0.37 0.37 0.39 0.39 0.40 0.40 0.41 0.42 0.42 0.43 0.43 0.44 0.45 0.45 0.46 0.46 0.46 0.47 0.47 0.47 0.52 0.52 0.53 0.53 0.53 0.55 0.58 0.58 0.59 0.62 0.65 0.71 0.74

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	91.4	32	0.46	0.34	0.62	0.07	INDIGENOUS(+)	32.30	48.40	19.30	0.00
2	8.6	3	0.70	0.65	0.74	0.05	REWORKED(O)				



SAMPLE ID: 1455.0 METRES SAMPLE TYPE: SWC

(Total No. of Readings=26) 0.42 0.43 0.44 0.45 0.45 0.45 0.45 0.46 0.46 0.47 0.47 0.47 0.48 0.49 0.49 0.50 0.51 0.51 0.52 0.52 0.54 0.54 0.54 0.55 0.57 0.63

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	26	0.49	0.42	0.63	0.05	INDIGENOUS(+)	32.90	52.60	13.20	0.00

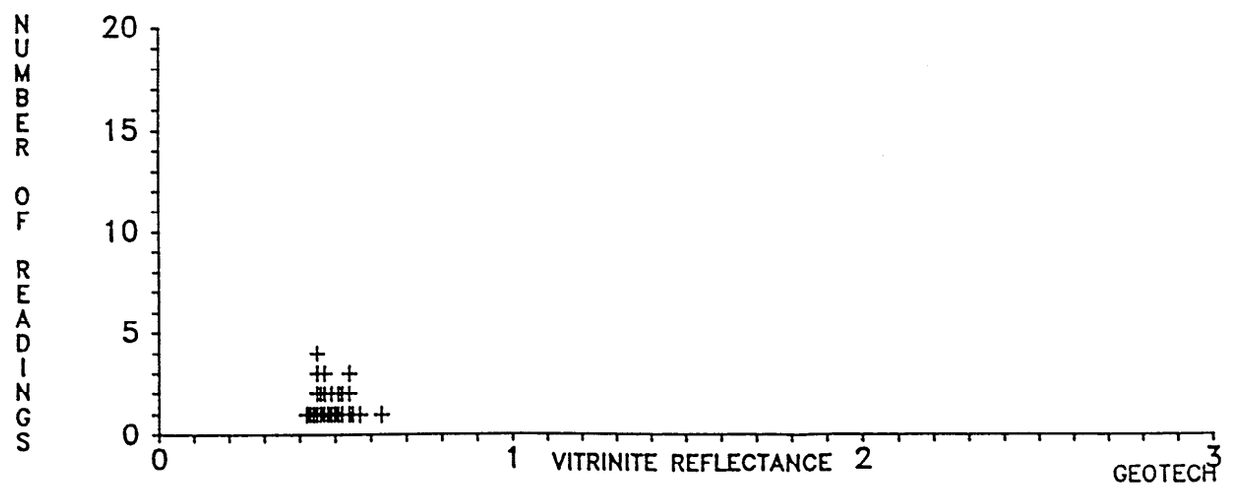


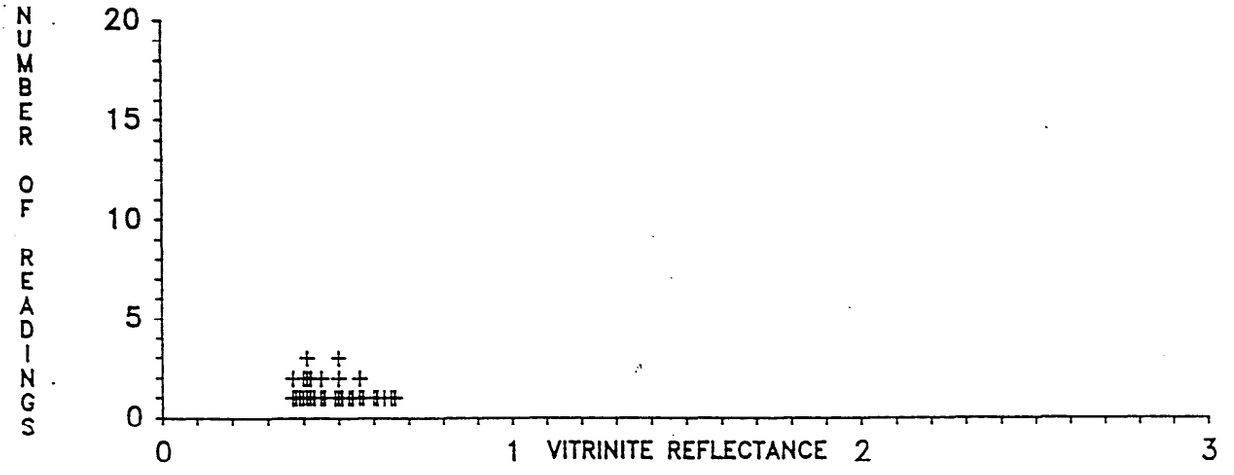
FIGURE 9 (cont'd)

VITRINITE REFLECTANCE AND COAL MACERAL INDENTIFICATION

WELL: ERIC THE RED-1 CLIENT: BHP PETROLEUM SAMPLE TYPE: SWC
SAMPLE ID: 1575.0 METRES DATE: MAY 1993

(Total No. of Readings=30) 0.37 0.37 0.38 0.39 0.40 0.40 0.41 0.41 0.41 0.42 0.42 0.43 0.45 0.45 0.46 0.49 0.50 0.50 0.50 0.51 0.53 0.54 0.56 0.56 0.57 0.60 0.61 0.63 0.65 0.66

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.00	30	0.49	0.37	0.66	0.09	INDIGENOUS(+)	42.70	55.60	1.70	0.00



SAMPLE ID: 1630.0 METRES SAMPLE TYPE: SWC

(Total No. of Readings=25) 0.41 0.44 0.44 0.44 0.45 0.45 0.46 0.46 0.46 0.47 0.47 0.47 0.50 0.50 0.51 0.52 0.56 0.56 0.58 0.59 0.59 0.60 0.60 0.62 0.65

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	25	0.51	0.41	0.65	0.07	INDIGENOUS(+)	28.20	56.30	15.50	0.00

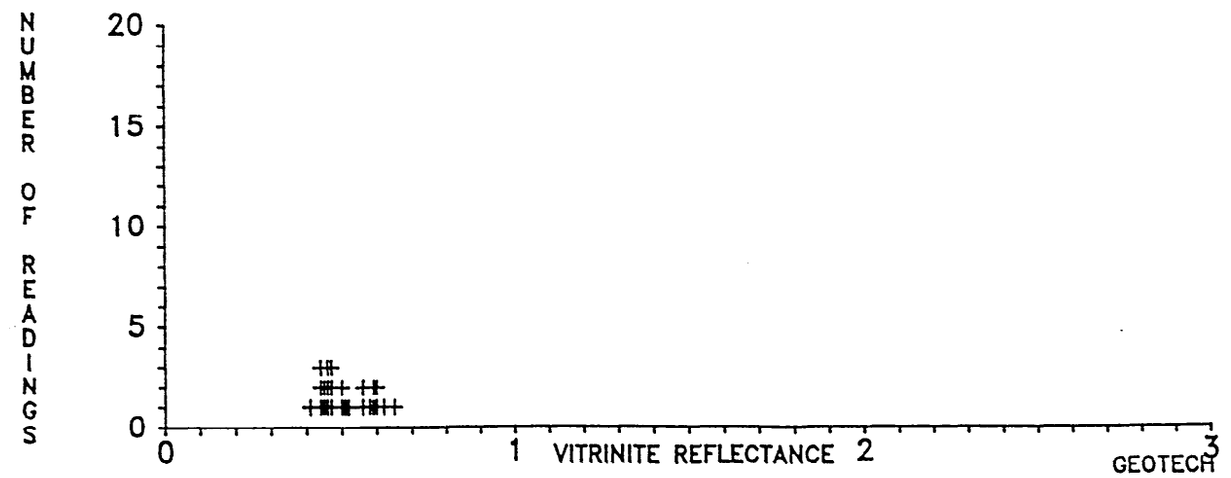


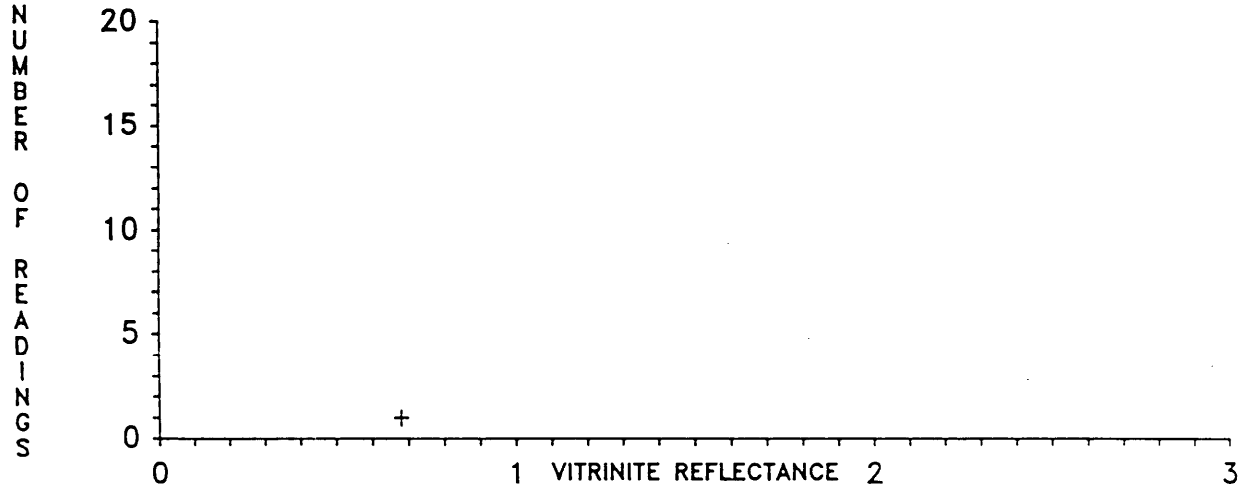
FIGURE 9 (cont'd)

VITRINITE REFLECTANCE AND COAL MACERAL INDENTIFICATION

WELL: ERIC THE RED 1 CLIENT: BHP PETROLEUM SAMPLE TYPE: SWC
SAMPLE ID: 1813.5 METRES DATE: MAY 1993

(Total No. of Readings=1) 0.68

VITRINITE REFLECTANCE								MACERAL IDENTIFICATION			
POPULATION Number	%	No. of Readings	Mean Ro (%)	Min Ro (%)	Max Ro (%)	STD Dev (%)	Comments	% Vitrinite	% Inertinite	% Liptinite	% Bitumen
1	100.0	3	0.68	0.68	0.68	0.00	INDIGENOUS(+)	33.30	33.30	33.40	0.00



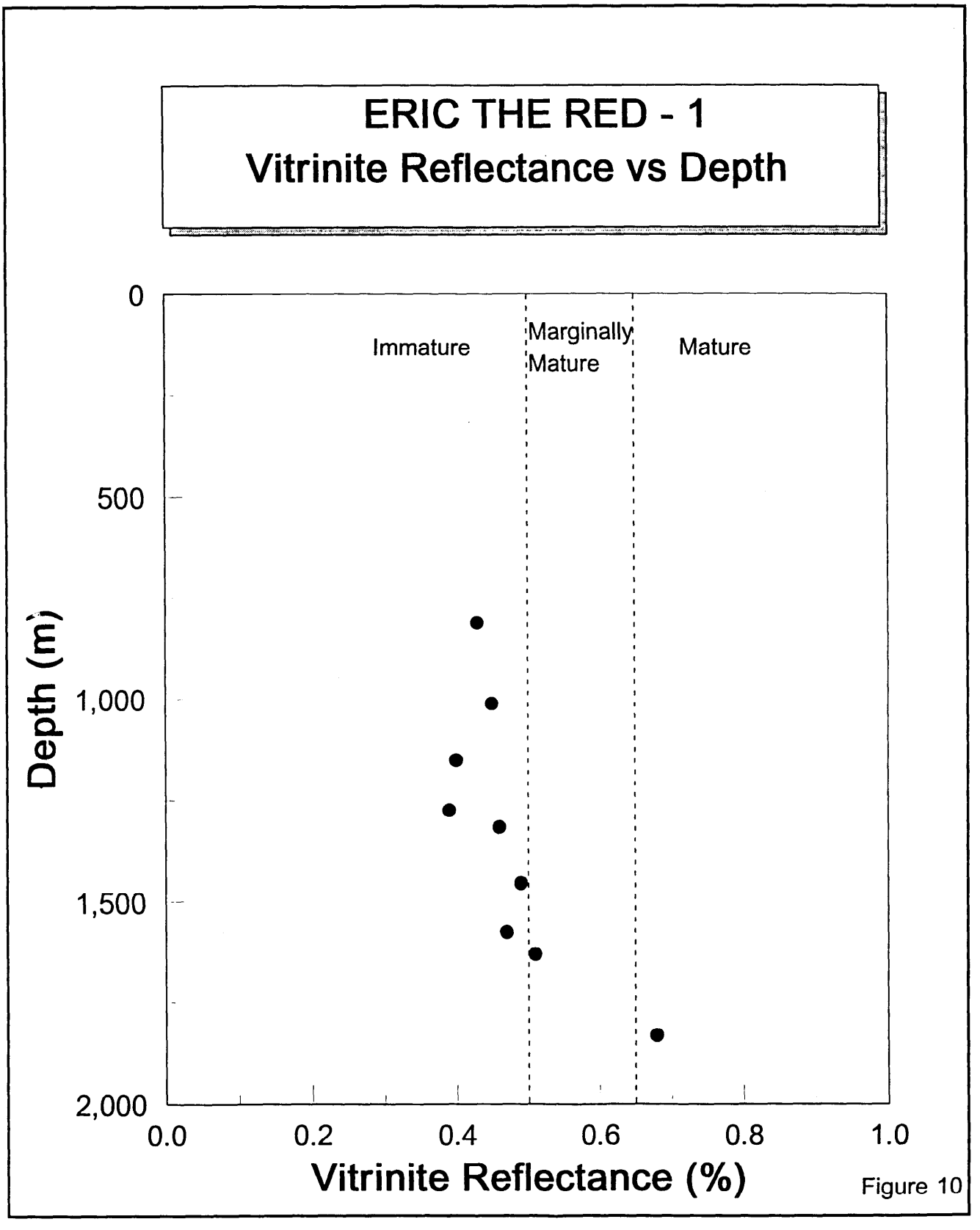

ERIC THE RED - 1
Vitrinite Reflectance vs Depth
Immature
Marginally Mature
Mature
Depth (m)
0
500
1,000
1,500
2,000
0.0
0.2
0.4
0.6
0.8
1.0
Vitrinite Reflectance (%)

Figure 10

TABLE 4

SUMMARY OF EXTRACTION AND LIQUID CHROMATOGRAPHY - SEDIMENTS

ERIC THE RED-1
Australia
Otway

DEPTH UNIT = Metres
DATE OF JOB = Dec 93

DEPTH 2	WEIGHT OF ROCK EXTD (grams)	TOTAL EXTRACT (ppm)	LOSS ON COLUMN (ppm)	% REC.	SATURATES (ppm)	AROMATICS (ppm)	POLARS (ppm)	SATURATES (rel %)	AROMATICS (rel %)	POLARS (rel %)	EOM(mg)/ TOC(g)	SAT(mg)/ TOC(g)	SAT/ AROM	HC/ non-HC
1097.00	11.00	689.7	-	-	-	-	-	-	-	-	-	-	-	-
1340.00	17.10	222.9	-	-	-	-	-	-	-	-	-	-	-	-

Extractable organic matter
Aromatic compounds
POLARS = Polar (Asphaltenes + resins)
HC = Hydrocarbon
TOC = Total organic carbon
REC. = Recovered
SAT = Saturated compounds
- = no data

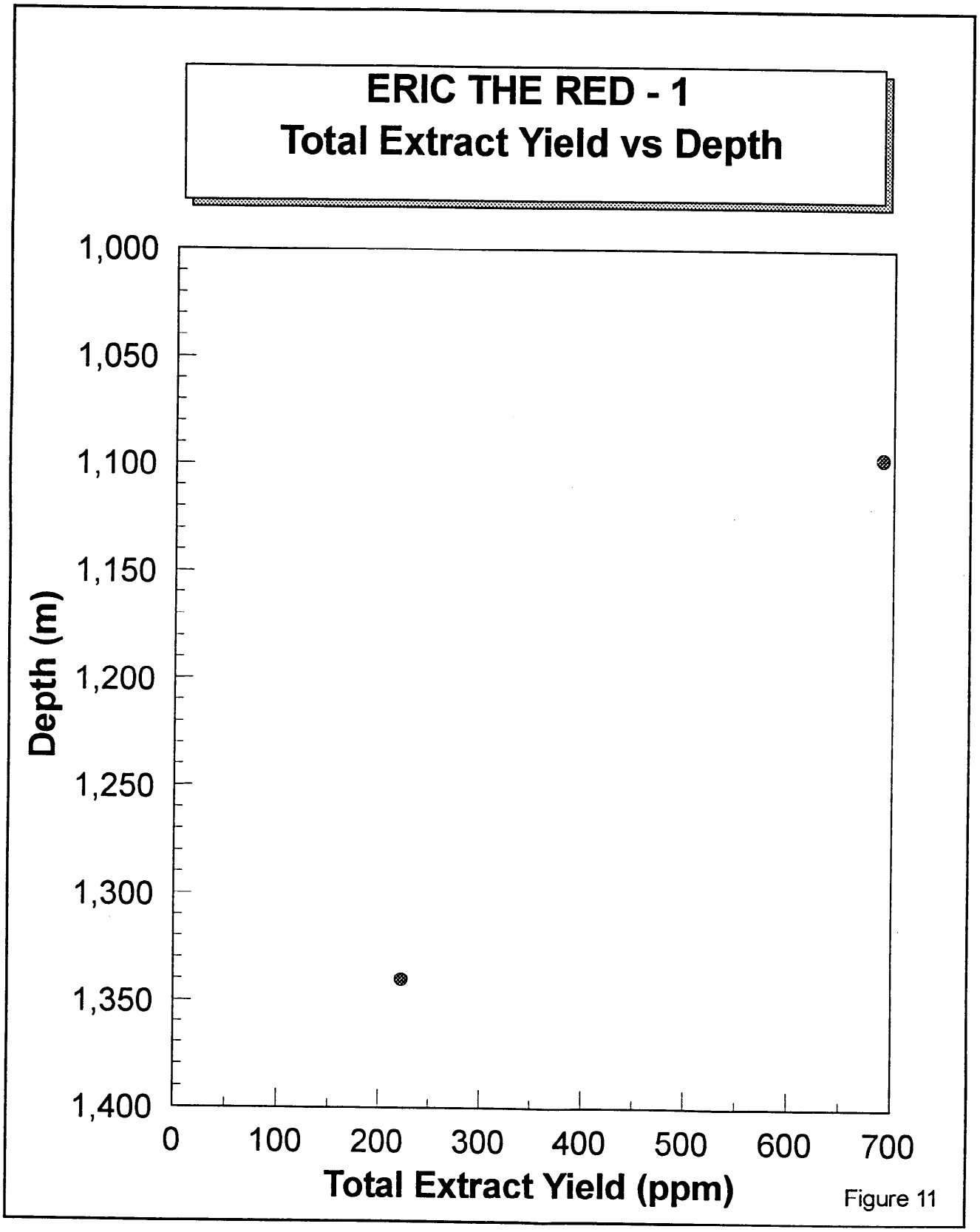

ERIC THE RED - 1
Total Extract Yield vs Depth
Depth (m)
1,000
1,050
1,100
1,150
1,200
1,250
1,300
1,350
1,400
0
100
200
300
400
500
600
700
Total Extract Yield (ppm)

Figure 11

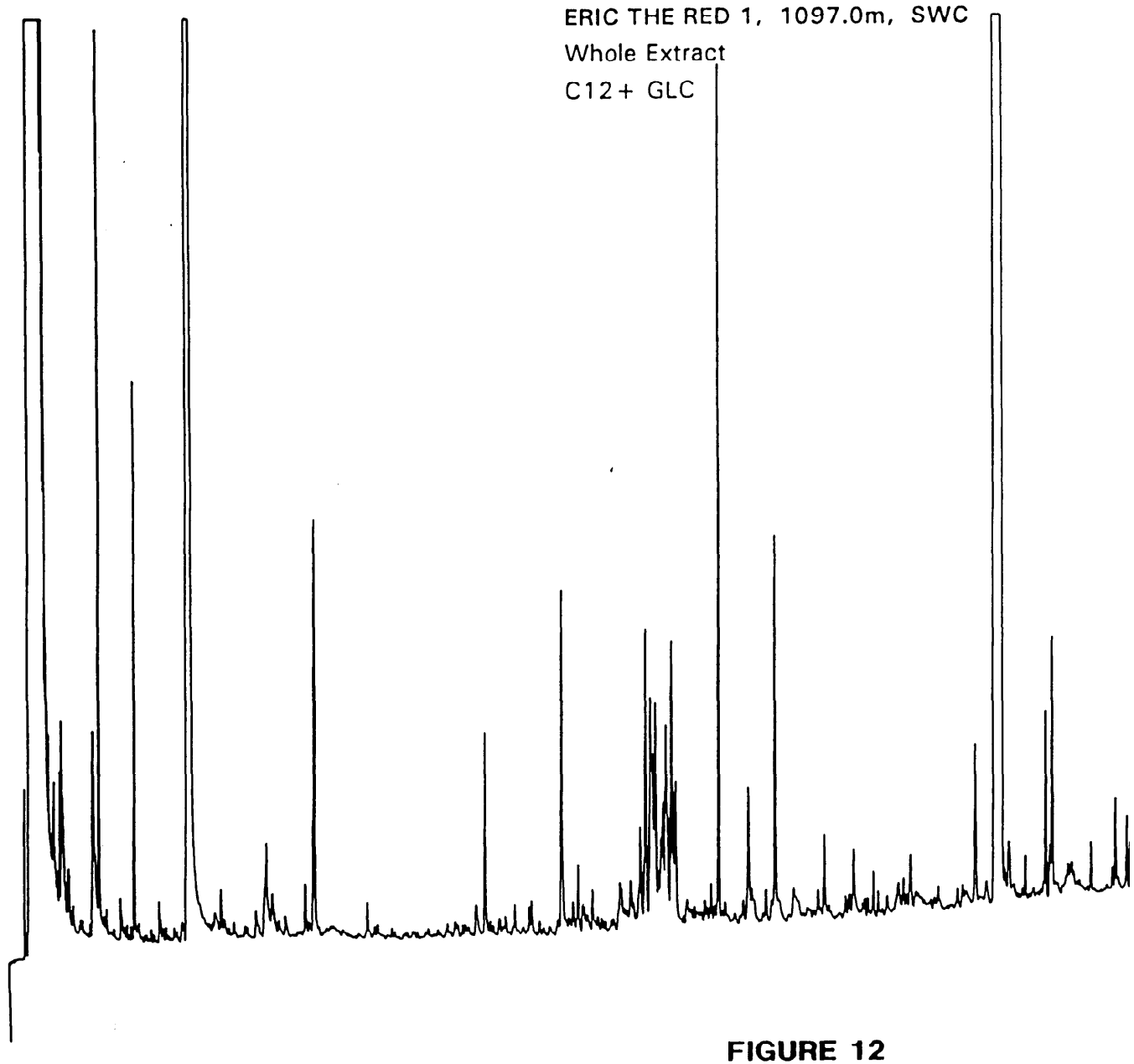


FIGURE 12

2030ED2

PE600052

This is an enclosure indicator page.
The enclosure PE600052 is enclosed within the container PE900173 at this location in this document.

The enclosure PE600052 has the following characteristics:

ITEM_BARCODE	= PE600052
CONTAINER_BARCODE	= PE900173
NAME	= ERIC THE RED 1 GEOCHEMISTRY LOG / PYROLYSIS SCREENING DATA
BASIN	= Otway
PERMIT	= VIC/P31
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= ERIC THE RED 1 GEOCHEMISTRY LOG / PYROLYSIS SCREENING DATA
REMARKS	=
DATE_CREATED	= 31/05/94
DATE_RECEIVED	= *
W_NO	= W1077
WELL_NAME	= ERIC THE RED 1
CONTRACTOR	= BHP
CLIENT_OP_CO	= BHP

(Inserted by DNRE - Vic Govt Mines Dept)