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Vitrinite reflectance (Ro) of dispersed organics from Shell PCI et al. **Panuke B-90**

Report No. EPGS-DOM.1-92MPA

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March 20, 1992

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G.S.C. Locality No.: D300 **Location:** 43°49'11.9"N, 60°42'34.6"W

R.T. Elevation: 23m **Water Depth:** 47m **Total Depth:** 3445m

Sampled Interval: 920 - 3445m **Interval Studied:** 1075 - 3385m

Depth Units: Metres referenced to R.T.[1] **Rig Release Date:** September 25, 1986

Vitrinite reflectance has been determined on 11 rotary cuttings samples and 3 conventional core samples (Table II) from Shell PCI et al. Panuke B-90 which was classified as a new field wildcat well and is located on the Scotian Shelf approximately 240 km east southeast of Halifax, Nova Scotia. Well status is plugged and abandoned, oil well.

Sample preparation followed the procedures listed in Appendix I. Data acquisition and manipulation for this report utilized the Zeiss Photometer III system with a custom interface to a microcomputer which provides reliable data acquisition and immediate statistical summaries.

The analysis of the well revealed the thermal maturation intervals given in Table I. The specific maturation levels, as set out in this report, are based on those of Dow (1977) with modified terminology (Appendix II).

Table I
Inferred Thermal Maturation Levels* (TVD)

47m (sea floor)	0.14	% Ro	immature
1815m	0.4	% Ro	immature approaching maturity
2190m	0.5	% Ro	marginally mature
2497m	0.6	% Ro	onset of significant oil generation
2981m	0.8	% Ro	peak of oil generation
3356m	1.0	% Ro	onset of significant wet gas generation
3663m	(1.2)	% Ro	onset of significant dry gas generation
3861m	(1.35)	% Ro	oil floor
4523m	(2.0)	% Ro	wet gas preservation limit
5205m	(3.0)	% Ro	dry gas preservation limit
3423m (T.D.)	1.04	% Ro	maturity at total depth

Note: ( )'s indicate Ro has been extrapolated at 0.258 log Ro/km

* Maturation levels are provided for all types of organic matter. Actual hydrocarbon products depend on type of organic matter present.

Note[1]: This well was significantly deviated from vertical during drilling. Therefore, in Table I and Figures 1 & 2 drilling depths have been converted to true vertical depths (TVD).

Remarks

Sample coverage for vitrinite reflectance analysis (Figure 1, Table II) was very good over the section penetrated by Panuke B-90. One sample was obtained from each of three conventional core sections. These provided good control in determining the maturation trend since the significant problem of contamination from cavings is eliminated in these samples. The data were plotted on a log Ro vs. linear depth scale and a linear regression line was calculated by the least squares method (Figure 1). The 'error bars' plotted on the maturation profile indicate one standard deviation on either side of the mean and may be deceivingly small for samples with very few readings. The slope of the maturation line is 0.258 log Ro/km.

Selection of the reflectance population which represents the maturation of the sediments was aided by the histogram display plot (Figure 2). Plotting the histograms on a log reflectance scale helps reveal linear trends in the Ro data. It also demonstrates the effects of cavings, geology, casing points and other factors on the vitrinite reflectance populations.

These vitrinite reflectance data provide evidence that the thermal regime at Panuke B-90, between 2190 and 3423m (T.D.), is suitable for the generation and preservation of hydrocarbons within the drilled section assuming potential source rocks and traps are present.

References

Dow, W.G., 1977. Kerogen studies and geological interpretations. Journal of Geochemical Exploration, no. 7, p. 77-99

March 20, 1992

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Table II

Summary of kerogen - based vitrinite reflectance[1]

Seq. #	Sample Labels	Depths in metres driller's	Depths in metres TVD	Mean Ro (SD) non-rotated	Number of Readings Total	Number of Readings Edited
1	WH002B	1075-1080	1074-1079	0.22(±.04)	7	7
2	WH002C	1295-1300	1289-1294	0.30(±.04)	6	6
3	WH003A	1445-1450	1436-1441	0.36(±.05)	13	13
4	WH003B	1605-1610	1593-1598	0.34(±.04)	20	20
5	WH003C	1790-1795	1773-1778	0.37(±.04)	23	20
6	WH004A	1865-1870	1847-1852	0.39(±.04)	21	19
7	WH001A	2050.4	2029.4	0.52(±.04)	18	18
8	WH001B	2217.7	2196.7	0.58(±.03)	22	18
9	WH001C	2401.8	2379.8	0.56(±.04)	11	11
10	WH004B	2645-2650	2623-2628	0.62(±.05)	32	32
11	WH004C	2825-2830	2803-2830	0.73(±.07)	26	24
12	WH005A	3020-3025	2998-3003	0.86(±.04)	37	35
13	WH005B	3145-3150	3123-3128	0.78(±.05)	18	12
14	WH005C	3330-3385	3357-3362	0.97(±.04)	19	12

Note: All samples are whole rocks preparations.
Note[1]: Driller's depths are as recorded by driller.
TVD are depths adjusted to true vertical depth.

Table III

Formation Tops (Wade, pers. comm.)

Formation	Depth TVD
Banquereau	in casing
Wyandot	?910m
Dawson Canyon	1059m
Petrel Member	1196-1199m
Logan Canyon	1289m
Marmora Member	1289m
Sable Member	?1544m
Cree Member	?1641m
Naskapi Member	2129m
Missisauga	2260m
upper member	2260m
"O" Marker	2448-2561m
middle member	2561m
lower member	3065m
Abenaki	3200m
Baccaro Member	3200m
Total Depth	3423m

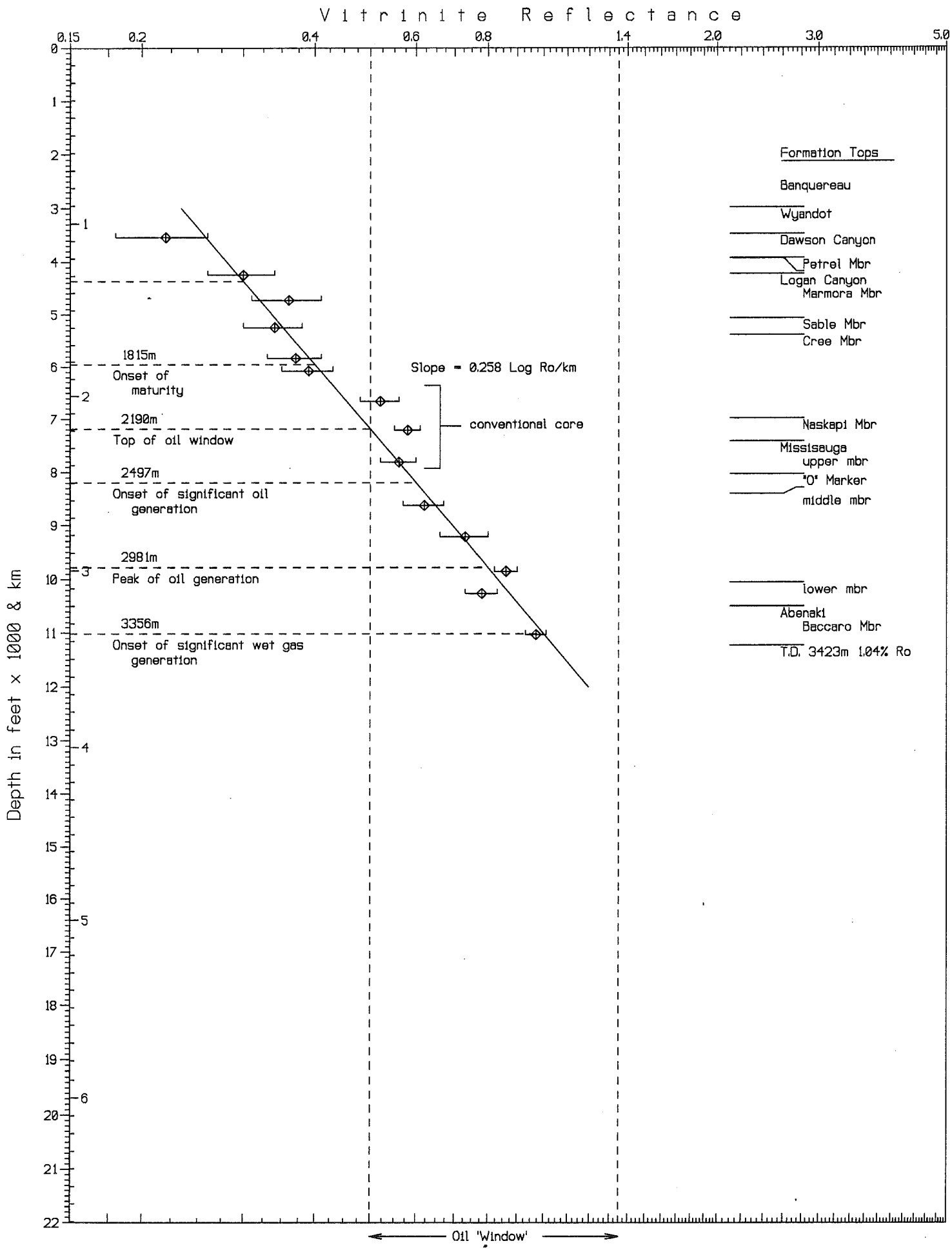


Fig. 1 Panuke B-90

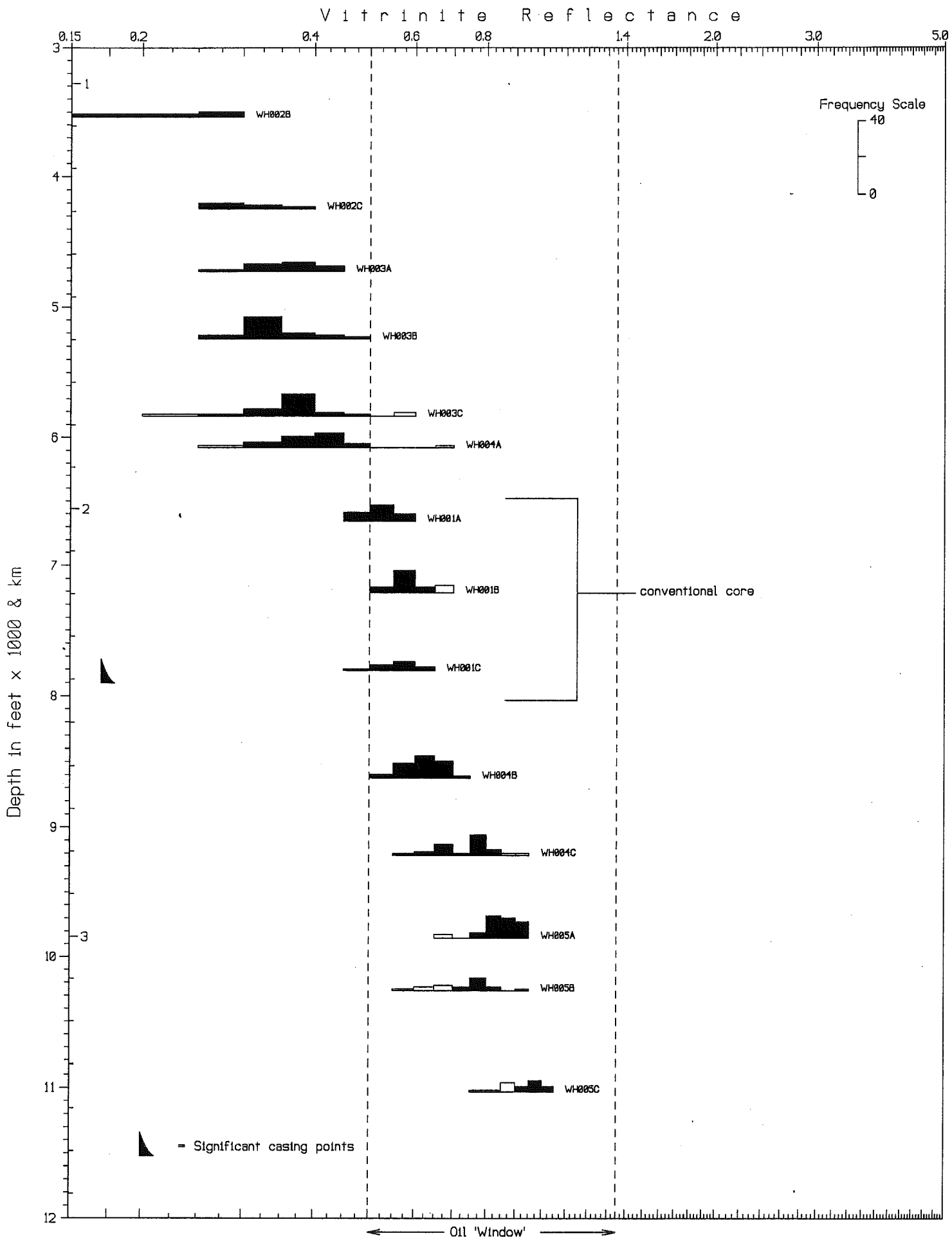


Fig. 2 Panuke B-90 <Histograms>

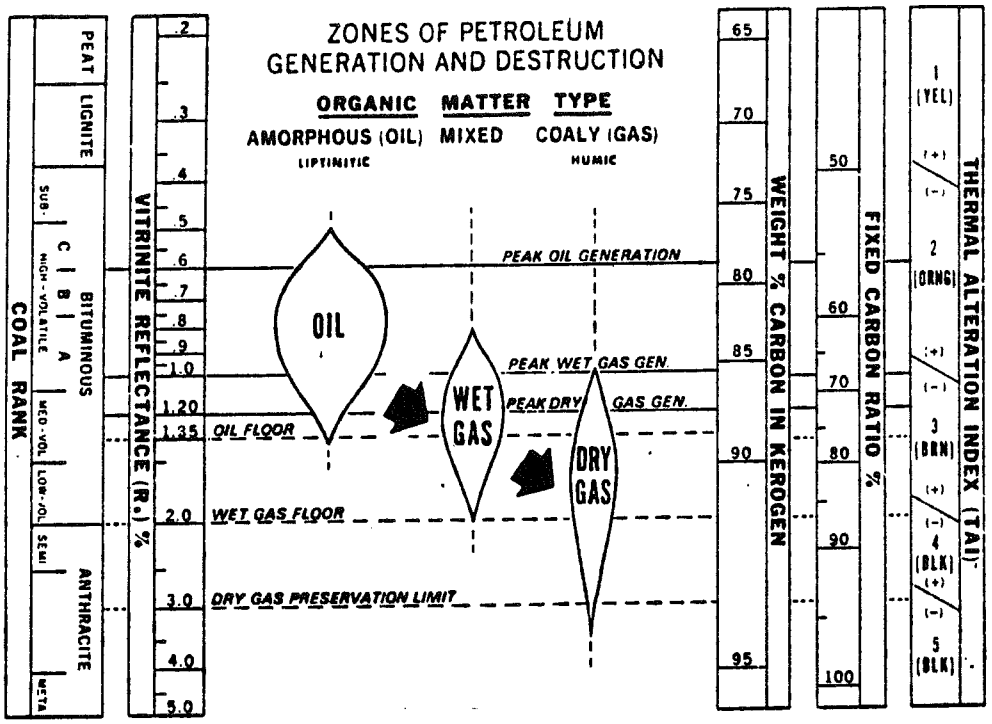
APPENDIX I

Sample Preparation Method

Whole Rock

Crush to 1mm.
Mold into 1" stub with epoxy resin (EPOFIX).
Polish to obtain low relief, scratch free surface.
Examine under oil lens, incident light at approximately 800x mag'n.

Appendix II (Dow, 1977)



Note: In this report, the terminology used to describe the various maturation levels has been modified. The 'peak' designation, as used in this figure, has been changed to 'onset of significant' and 0.8 Ro is here used as the 'peak of oil generation'

Appendix III

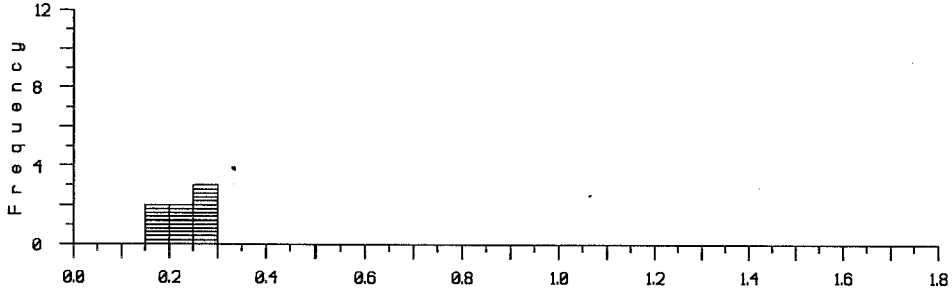
Reflectance Histograms

WH002B, 1075-1080m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.17<	0.18<	0.20<	0.23<	0.26<	0.26<	0.27<			

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.22	0.04	7	0.17	0.27	1.57
Edit<	0.22	0.04	7	0.17	0.27	1.57

Reflectance Histogram

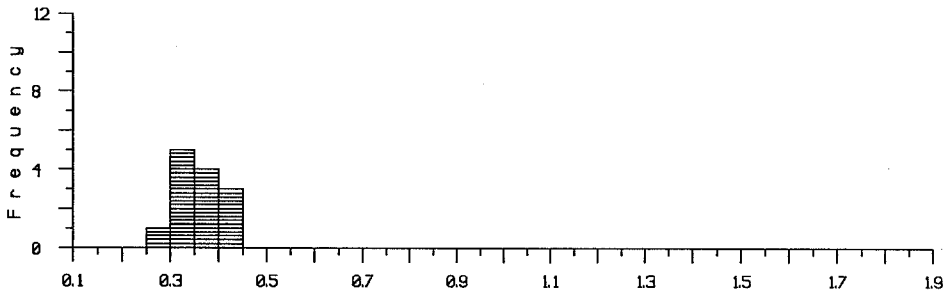


WH003A, 1445-1450m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.29<	0.30<	0.31<	0.33<	0.34<	0.35<	0.37<	0.38<	0.39<	0.39<
1	0.42<	0.42<	0.43<							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.36	0.05	13	0.29	0.43	4.72
Edit<	0.36	0.05	13	0.29	0.43	4.72

Reflectance Histogram

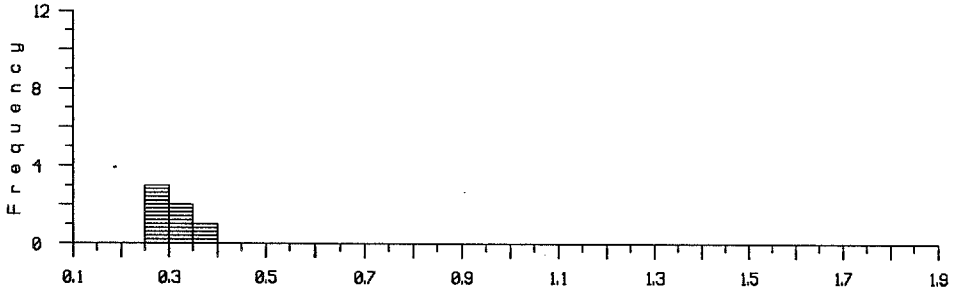


WH002C, 1295-1300m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.26<	0.28<	0.28<	0.31<	0.34<	0.36<				

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.30	0.04	6	0.26	0.36	1.83
Edit<	0.30	0.04	6	0.26	0.36	1.83

Reflectance Histogram

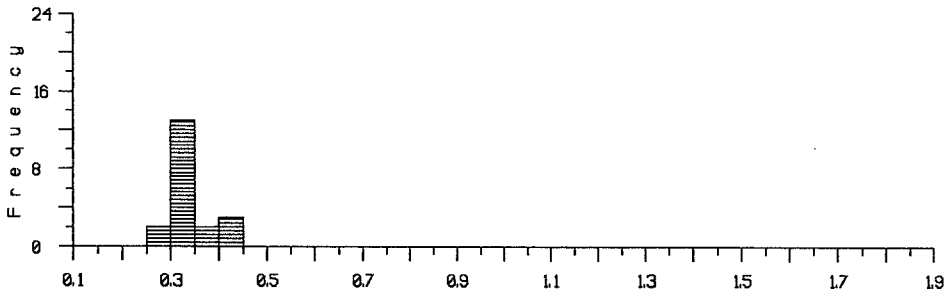


WH003B, 1605-1610m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.26<	0.29<	0.30<	0.31<	0.31<	0.32<	0.32<	0.32<	0.32<	0.33<
1	0.33<	0.34<	0.34<	0.34<	0.35<	0.36<	0.36<	0.41<	0.42<	0.45<
2										

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.34	0.04	20	0.26	0.45	6.78
Edit<	0.34	0.04	20	0.26	0.45	6.78

Reflectance Histogram

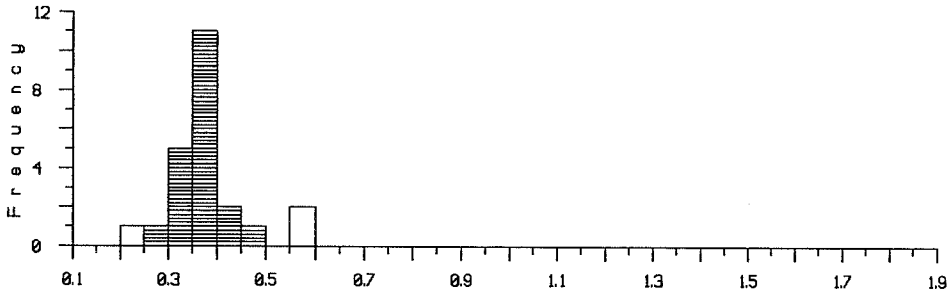


WH003C, 1790-1795m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.22	0.29<	0.30<	0.32<	0.33<	0.34<	0.35<	0.36<	0.36<	0.36<
1	0.37<	0.37<	0.37<	0.37<	0.38<	0.38<	0.38<	0.39<	0.43<	0.44<
2	0.46<	0.56	0.59							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.38	0.08	23	0.22	0.59	8.72
Edit<	0.37	0.04	20	0.29	0.46	7.35

Reflectance Histogram

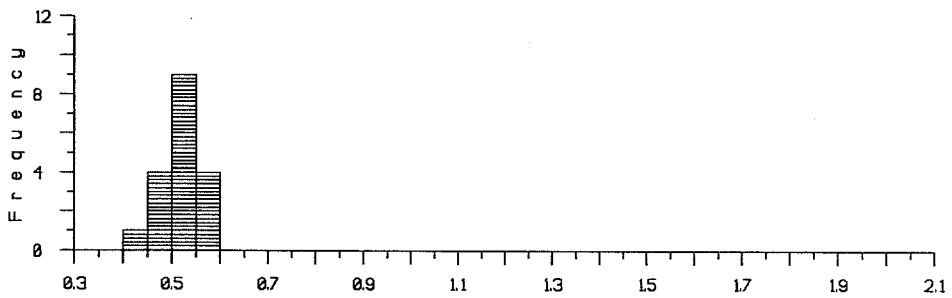


WH001A, 2050.4m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.45<	0.47<	0.48<	0.48<	0.49<	0.50<	0.52<	0.53<	0.53<	0.54<
1	0.54<	0.54<	0.54<	0.54<	0.55<	0.55<	0.56<	0.59<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.52	0.04	18	0.45	0.59	9.40
Edit<	0.52	0.04	18	0.45	0.59	9.40

Reflectance Histogram

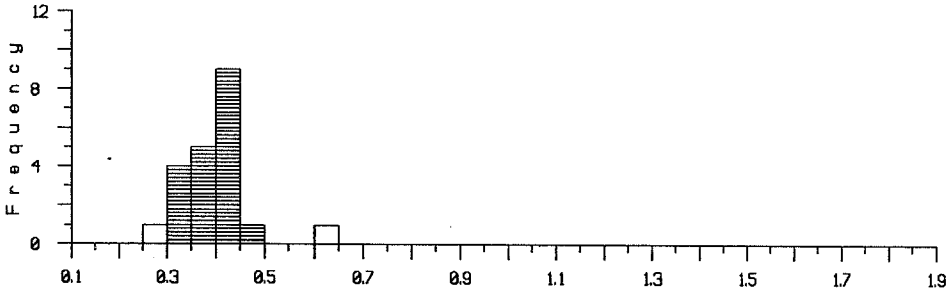


WH004A, 1865-1870m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.25	0.32<	0.33<	0.34<	0.35<	0.37<	0.37<	0.37<	0.38<	0.39<
1	0.40<	0.40<	0.40<	0.41<	0.42<	0.42<	0.42<	0.43<	0.45<	0.48<
2	0.65									

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.40	0.08	21	0.25	0.65	8.35
Edit<	0.39	0.04	19	0.32	0.48	7.45

Reflectance Histogram

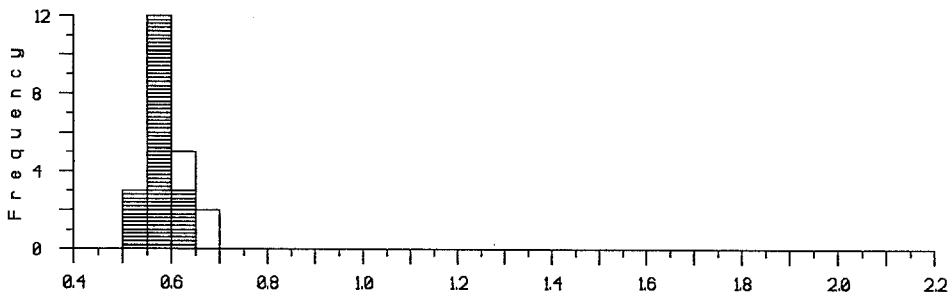


WH001B, 2217.7m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.52<	0.54<	0.54<	0.56<	0.57<	0.57<	0.57<	0.57<	0.58<	0.58<
1	0.58<	0.58<	0.58<	0.58<	0.59<	0.61<	0.63<	0.63<	0.65	0.65
2	0.69	0.69								

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.59	0.05	22	0.52	0.69	13.06
Edit<	0.58	0.03	18	0.52	0.63	10.38

Reflectance Histogram

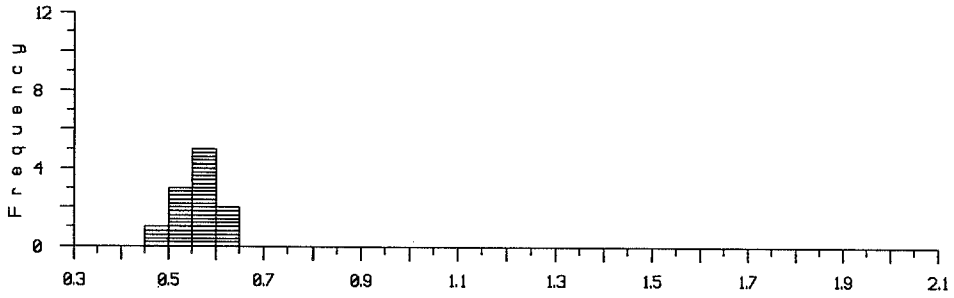


WH001C, 2401.8m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.49<	0.51<	0.54<	0.54<	0.55<	0.56<	0.57<	0.57<	0.59<	0.61<
1	0.62<									

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.56	0.04	11	0.49	0.62	6.15
Edit<	0.56	0.04	11	0.49	0.62	6.15

Reflectance Histogram

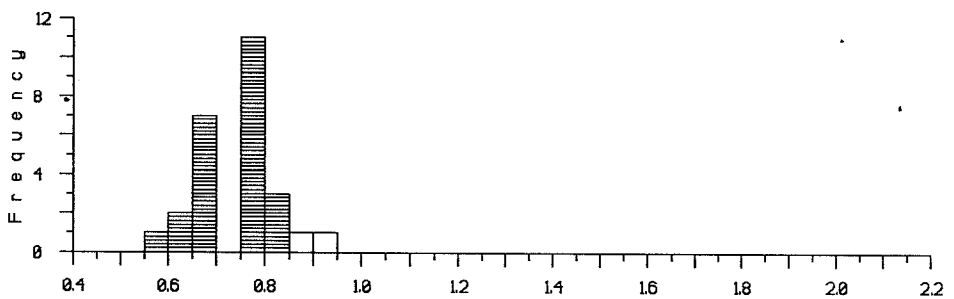


WH004C, 2825-2830m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.59<	0.62<	0.64<	0.67<	0.68<	0.68<	0.68<	0.68<	0.68<	0.70<
1	0.75<	0.75<	0.76<	0.77<	0.78<	0.78<	0.79<	0.79<	0.79<	0.79<
2	0.79<	0.80<	0.81<	0.84<	0.87	0.91				

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.75	0.08	26	0.59	0.91	19.39
Edit<	0.73	0.07	24	0.59	0.84	17.61

Reflectance Histogram

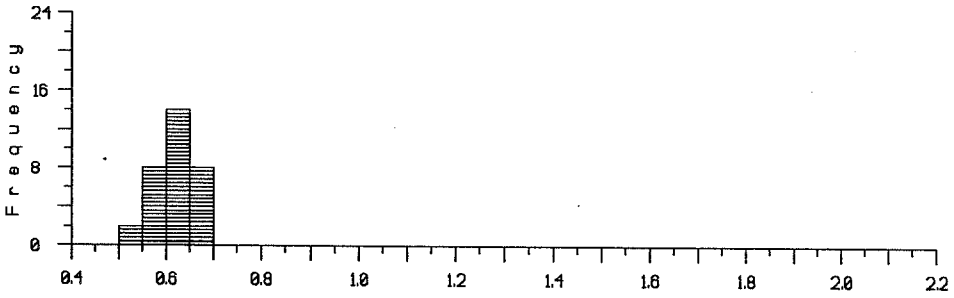


WH004B, 2645-2650m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.52<	0.53<	0.55<	0.56<	0.56<	0.57<	0.57<	0.57<	0.58<	0.59<
1	0.60<	0.60<	0.60<	0.61<	0.61<	0.62<	0.62<	0.62<	0.63<	0.63<
2	0.64<	0.64<	0.65<	0.65<	0.66<	0.66<	0.67<	0.68<	0.69<	0.69<
3	0.69<	0.70<								

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.62	0.05	32	0.52	0.70	19.76
Edit<	0.62	0.05	32	0.52	0.70	19.76

Reflectance Histogram

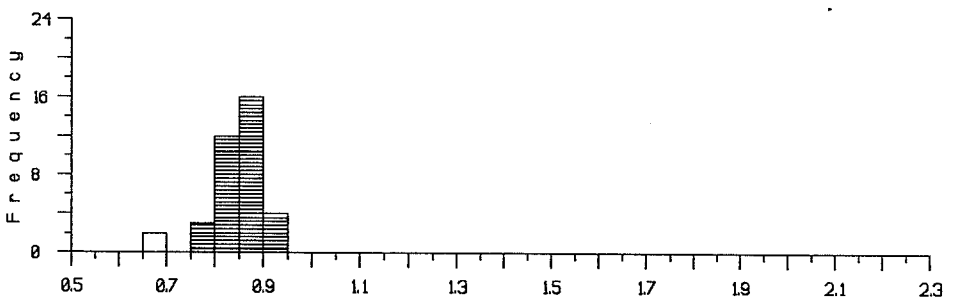


WH005A, 3020-3025m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.67	0.68	0.78<	0.79<	0.79<	0.80<	0.81<	0.82<	0.82<	0.82<
1	0.83<	0.83<	0.83<	0.83<	0.84<	0.84<	0.84<	0.85<	0.85<	0.85<
2	0.86<	0.86<	0.86<	0.87<	0.87<	0.88<	0.88<	0.89<	0.90<	0.90<
3	0.90<	0.90<	0.90<	0.92<	0.92<	0.93<	0.93<			

	Mean	Stand. Dev	Pts	Min	Max	Sum
Total	0.85	0.06	37	0.67	0.93	31.34
Edit<	0.86	0.04	35	0.78	0.93	29.99

Reflectance Histogram

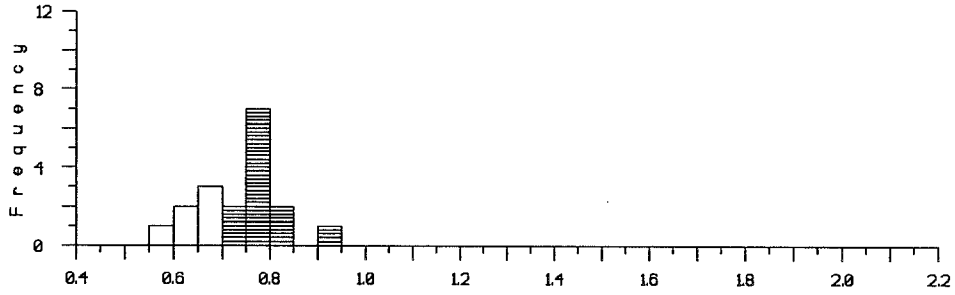


WH005B, 3145-3150m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.58	0.60	0.61	0.66	0.67	0.67	0.72<	0.74<	0.75<	0.75<
1	0.75<	0.76<	0.77<	0.78<	0.79<	0.83<	0.83<	0.91<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.73	0.08	18	0.58	0.91	13.20
Edit<	0.78	0.05	12	0.72	0.91	9.38

Reflectance Histogram



WH005C, 3330-3385m,Panuke B-90

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.78	0.80	0.85	0.86	0.87	0.88	0.88	0.90<	0.92<	0.92<
1	0.95<	0.96<	0.97<	0.98<	0.99<	0.99<	1.00<	1.03<	1.04<	

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.92	0.07	19	0.78	1.04	17.57
Edit<	0.97	0.04	12	0.90	1.04	11.65

Reflectance Histogram