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Vitrinite reflectance (Ro)
of dispersed organics
from eight
Grand Banks wells

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Vitrinite reflectance has been determined on drill cuttings samples from eight wells (Table I) on the Grand Banks approximately 300km east southeast of St. John's, Newfoundland. These samples were measured at the request of Dr. M. Williamson as part of a fission track study of the same wells. The fission track study is being carried out by Dr. C. Ravenhurst and J. Shimeld of Dalhousie University.

Sample preparation followed the procedure for whole rock listed in Appendix I. Vitrinite reflectance data for this report was gathered using a Zeiss Photometer III system with a custom interface to a DOS-based microcomputer providing data acquisition and statistical summaries.

Table I
Well information

Well	GSC Loc #	Location	Total Depth	Water Depth
Fortune G-57	D292	46°36'18.8 "N 48°08'02.6 "W	4995m	116m
Hibernia B-08	D191	46°47'06.36"N 48°45'29.87"W	4435m	83m
Hibernia J-34	D206	46°43'33.84"N 48°50'13.00"W	3712m	78m
Rankin M-36	D229	46°35'46.58"N 48°50'56.26"W	3967m	72m
Terra Nova I-97	D291	46°26'43.7 "N 48°28'49.3 "W	3465m	97m
Terra Nova K-07	D282	46°26'43.5 "N 48°30'58.1 "W	3550m	95m
Terra Nova K-17	D284	46°26'43.4 "N 48°32'31.8 "W	3250m	94m
Terra Nova K-18	D259	46°27'44.05"N 48°32'31.58"W	3925m	91m

Remarks

Data for individual wells (Table II) are plotted on a log Ro versus linear depth scale (Figures 1-8). Provided there was sufficient data, maturation slopes were determined by the least squares method for each well. Some of the wells in this report are compared with data from earlier reports of the same or close by well. In general, the maturation slopes of the wells in the earlier reports although based on more points are considered depressed from actual values because of oil stained vitrinite. The data points in this report while they yielded fewer readings per sample tended to be in higher reflectance ranges than the earlier data.

Specific maturation levels, as used in this report, are based on those of Dow (1977) with modified terminology (Appendix II).

Fortune G-57

One sample was provided for this well and it yielded only five reflectance values. The mean of these values (0.77 %Ro) plots in the middle of the 'oil window' (Figure 1).

Hibernia B-08

The six samples provided for this well give basic coverage of the section from 2160 to 4185m. The maturation slope has a calculated value of 0.158 log Ro/km and is plotted in Figure 2. This slope is significantly higher than the slope (0.079 log Ro/km) cited in an earlier report on this well (Avery 1985). There is some scatter at the top of the line which is reflected in a correlation coefficient of 0.908. The line indicates that most of this section of the well is within the 'oil window'.

Hibernia J-34

One sample was provided for this well and it yielded only six reflectance values. The mean of these values (0.62 %Ro) plots within the 'oil window' (Figure 3). This point also plots very close to the maturation slope for Hibernia B-08 well cited in this report (Figure 2).

Rankin M-36

The seven samples provided for this well give basic coverage of the section from 1615 to 3755m. The maturation slope has a calculated value of 0.239 log Ro/km and is plotted in Figure 4. This slope is significantly higher than the slope (slope value was not given) of the line plotted in an earlier report on this well (Ervine '84; internal contract report). The maturation curve in the earlier report did not reach the 'oil window', even at TD. The points fit the line very well (correlation coefficient 0.991) and indicate an even progression from slightly immature (above 2030m) to almost the base of the 'oil window' at TD (3971m).

Terra Nova I-97

The two samples provided for this well give minimal coverage of the section from 2260 to 3320m. The maturation slope was calculated at 0.224 log Ro/km and is plotted on Figure 5. This is similar to the slope calculated for Terra Nova K-17 in this report but plots higher in the well section indicating that it reaches a slightly higher maturity earlier. Comparing it with the slope (0.140 log Ro/km) given in an earlier report on Terra Nova K-08 well (Avery 1987) it is a much higher. At TD (4500m) in K-08 the curve indicated a maturity of 0.88 % Ro. If the curve for I-97 (based on only two points) were projected to this depth it would plot significantly beyond the oil window (approx. 1.9 % Ro).

Terra Nova K-07

The five samples provided for this well give basic coverage of the section from 1585 to 3360m. The maturation slope was calculated at 0.169 log Ro/km and is plotted in Figure 6. This is similar to the slope (0.140 log Ro/km) of the line given for Terra Nova K-08 well (Avery 1987). The points fit the line reasonably well (correlation coefficient 0.953) and indicate a progression from slightly immature (above 2535m) to the middle of the 'oil window' at TD (3550m).

Terra Nova K-17

The five samples provided for this well give basic coverage of the section from 1585 to 3360m. The maturation slope was calculated at 0.267 log Ro/km and is plotted in Figure 7. This is significantly higher than the slope (0.140 log Ro/km) of the line given for Terra Nova K-08 well (Avery 1987). The points display considerable scatter (correlation coefficient 0.826) and indicate a general progression from slightly immature (above approximately 2352m) to the middle of the 'oil window' at TD (3250m).

Terra Nova K-18

One sample was provided for this well and it yielded 15 reflectance values. The mean of these values (0.40 % Ro) plots outside the 'oil window' in the 'immature' zone. This point also plots very close to maturation slopes of the other Terra Nova wells in this report.

Table II

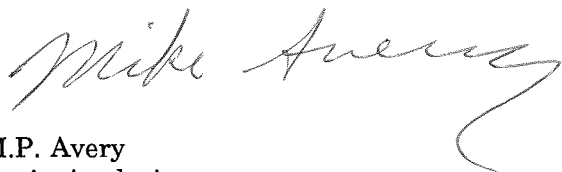
Summary of whole rock - based vitrinite reflectance

Seq. #	Sample Labels	Depths in metres	Mean Ro (SD) non-rotated	Number of Readings	
				Total	Edited
Fortune G-57					
1	PH1934	2970-3020	0.77(±.05)	6	5
Hibernia B-08					
1	PH1935	2125-2160	0.49(±.03)	22	22
2	PH1936	2320-2360	0.55(±.07)	9	9
3	PH1937	2755-2780	0.48(±.03)	8	8
4	PH1938	3040-3090	0.56(±.04)	17	17
5	PH1939	3570-3605	0.73(±.03)	5	5
6	PH1933	4155-4185	1.07(±.09)	22	22
Hibernia J-34					
1	PH1940	2630-2660	0.62(±.09)	6	6
Rankin M-36					
1	PH1927	1575-1615	0.36(±.03)	10	9
2	PH1928	1795-1845	0.47(±.04)	10	10
3	PH1929	2045-2095	0.56(±.04)	12	10
4	PH1930	2555-2595	0.70(±.09)	14	14
5	PH1941	2760-2820	0.75(±.09)	13	13
6	PH1931	3440-3485	1.14(±.11)	22	21
7	PH1932	3710-3755	1.24(±.09)	23	18
Terra Nova I-97					
1	PH1942	2240-2260	0.59(±.04)	10	10
2	PH1943	3300-3320	1.02(±.08)	34	17
Terra Nova K-07					
1	PH1950	1585-1605	0.34(±.05)	12	12
2	PH1951	1870-1890	0.41(±.03)	17	17
3	PH1952	2275-2290	0.49(±.07)	13	13
4	PH1953	2470-2490	0.43(±.03)	7	7
5	PH1954	3335-3360	0.71(±.09)	24	20
Terra Nova K-17					
1	PH1945	1645-1675	0.37(±.02)	11	11
2	PH1946	2345-2380	0.44(±.05)	18	18
3	PH1947	2515-2550	0.42(±.04)	18	18
4	PH1948	2660-2690	0.79(±.04)	8	6
5	PH1949	3060-3090	0.85(±.11)	19	12
Terra Nova K-18					
1	PH1944	1690-1710	0.40(±.03)	15	15

References

- Avery, M.P., 1985. Vitrinite reflectance (Ro) of dispersed organics and coaly matter from Mobil et al. Hibernia B-08 (Revised report). Geological Survey of Canada, Open File 1201.
- Avery, M.P., 1987. Vitrinite Reflectance (Ro) of dispersed organics from Petro-Canada Terra Nova K-08. Geological Survey of Canada, Open File 1805.
- Dow, W.G., 1977. Kerogen studies and geological interpretations. Journal of Geochemical Exploration, no. 7, p. 77-99

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Vitrinite Reflectance

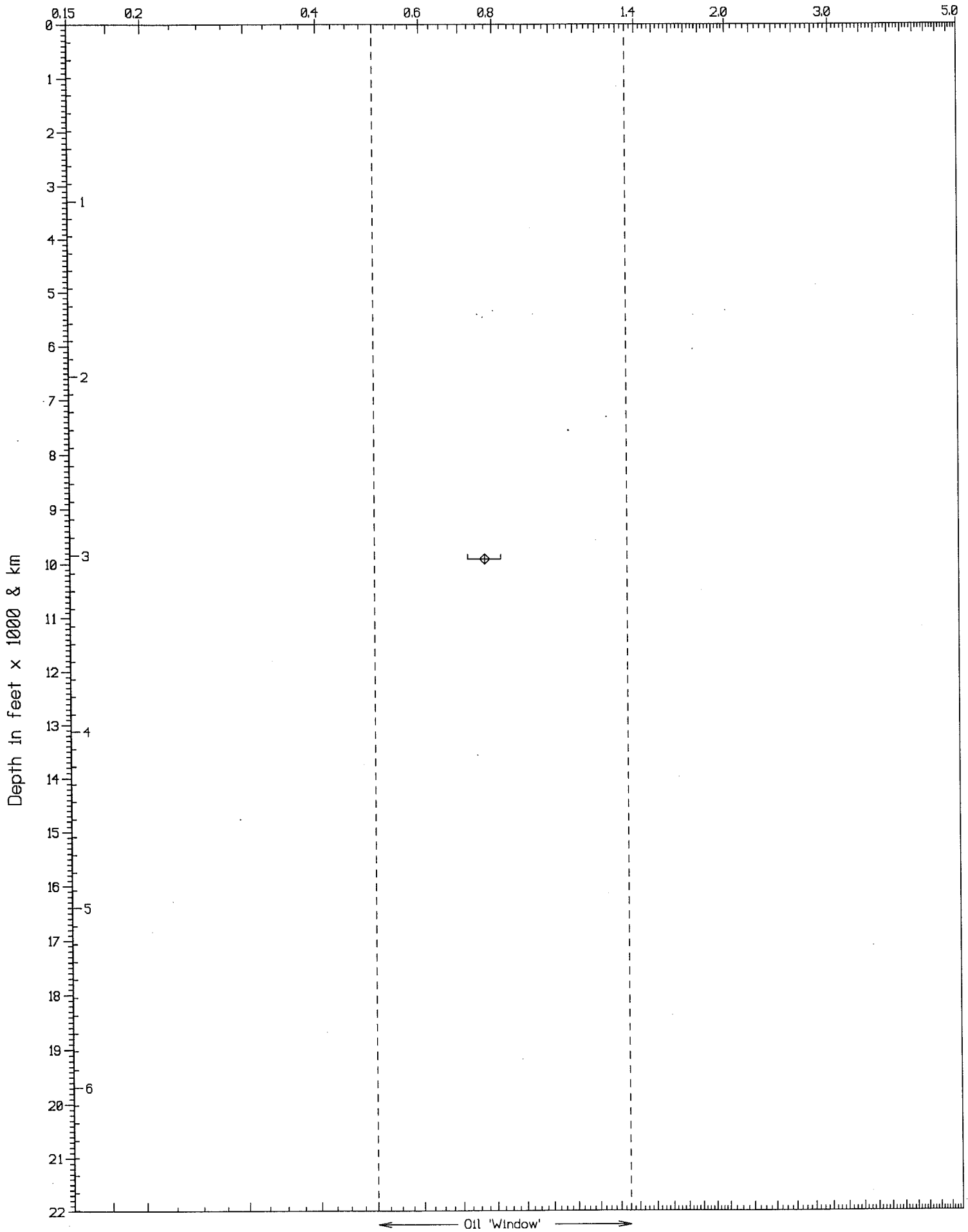


Fig. 1 Fortune G-57 (D292)

Vitrinite Reflectance

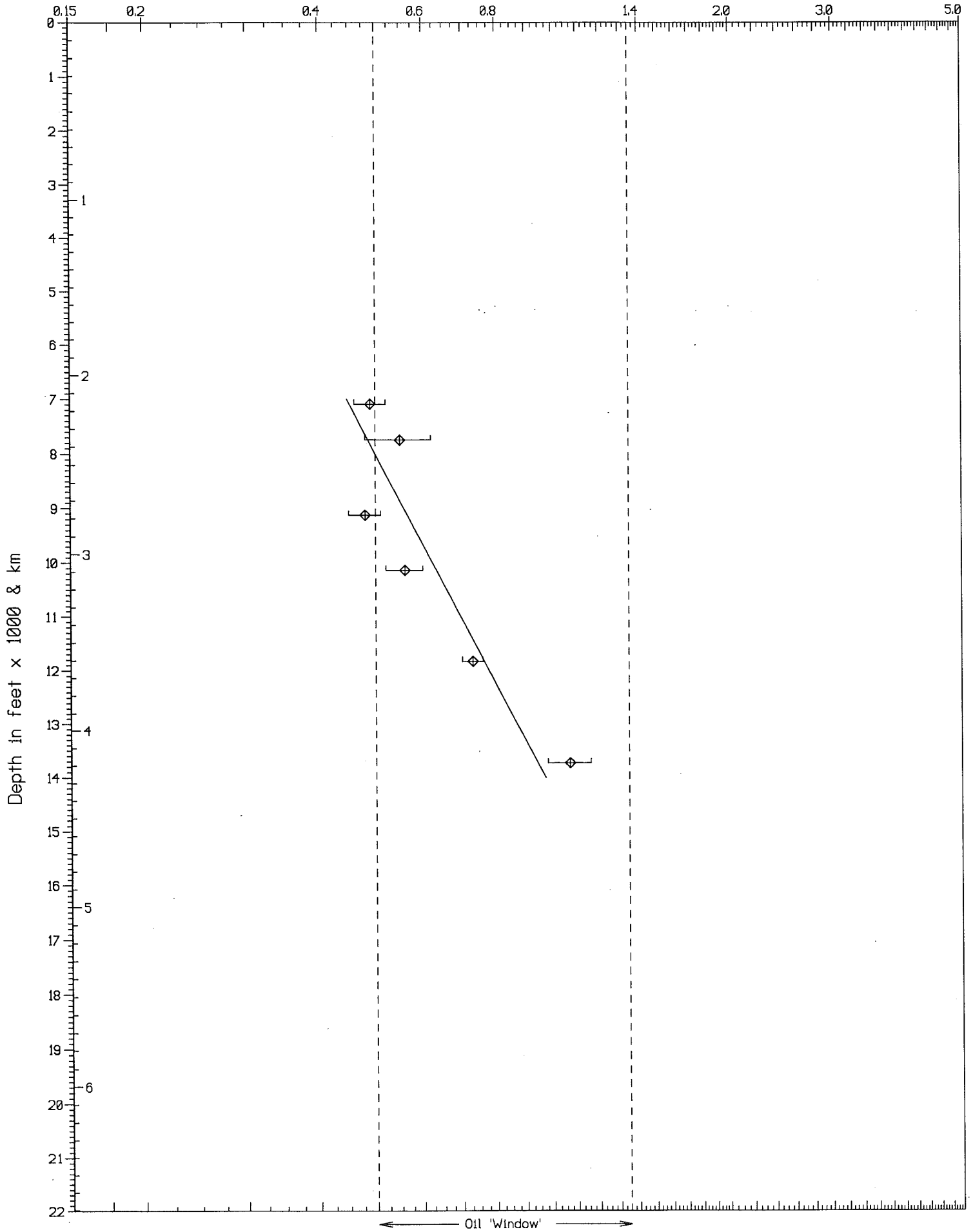


Fig. 2 Hibernia B-08 (D191)

Vitrinite Reflectance

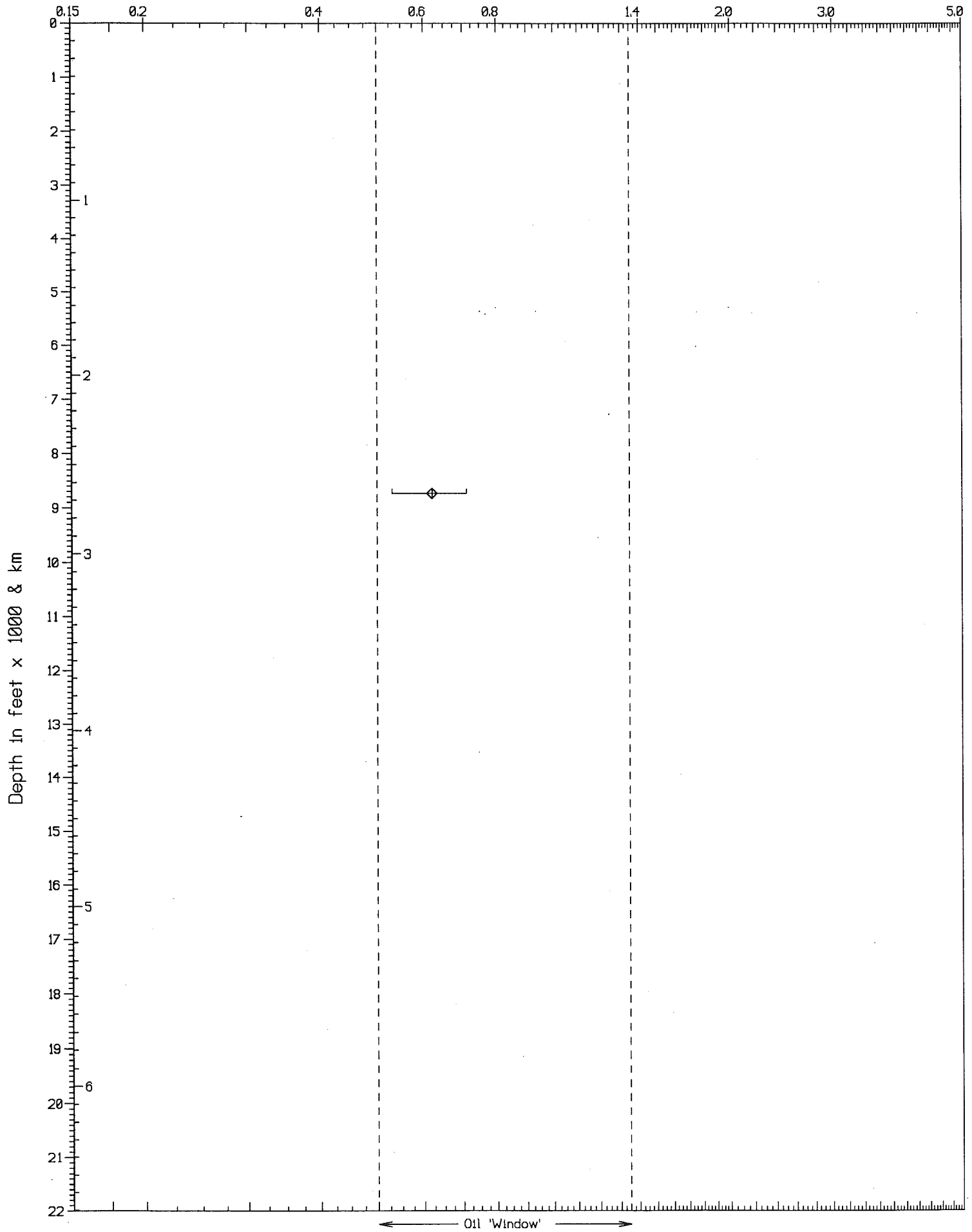


Fig. 3 Hibernia J-34 (D206)

Vitrinite Reflectance

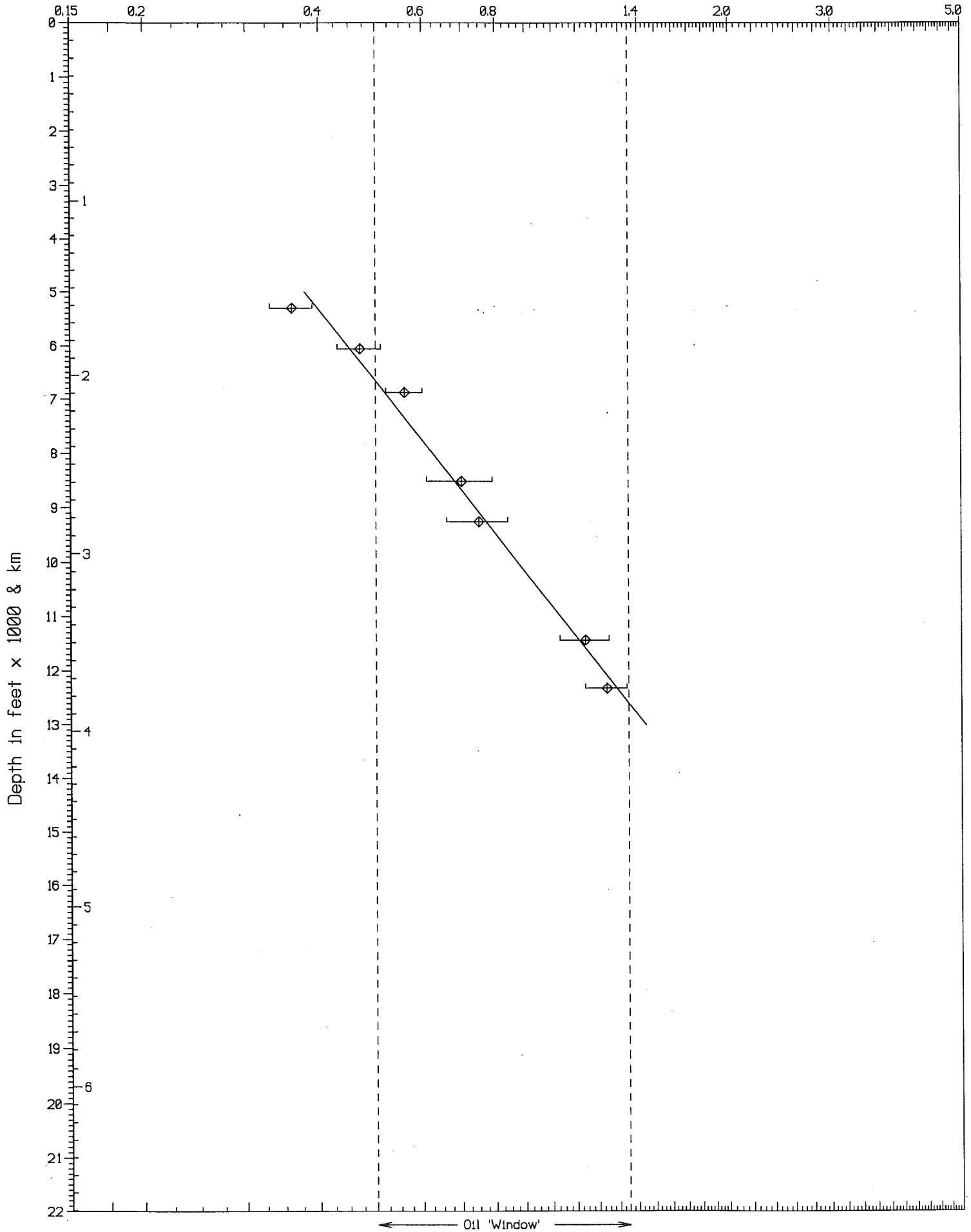


Fig. 4 RankIn M-36 (D229)

Vitrinite Reflectance

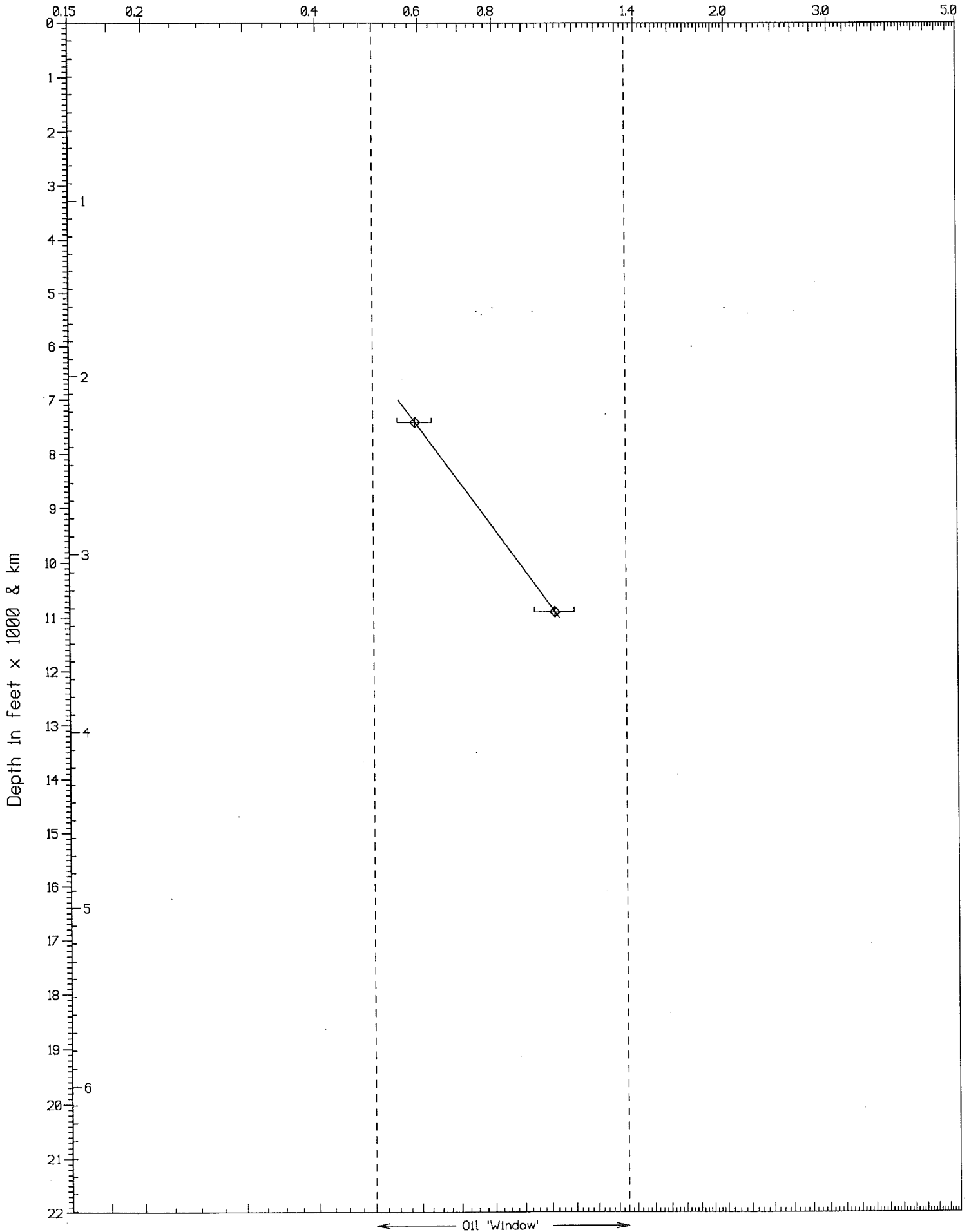


Fig. 5 Terra Nova I-97 (D291)

Vitrinite Reflectance

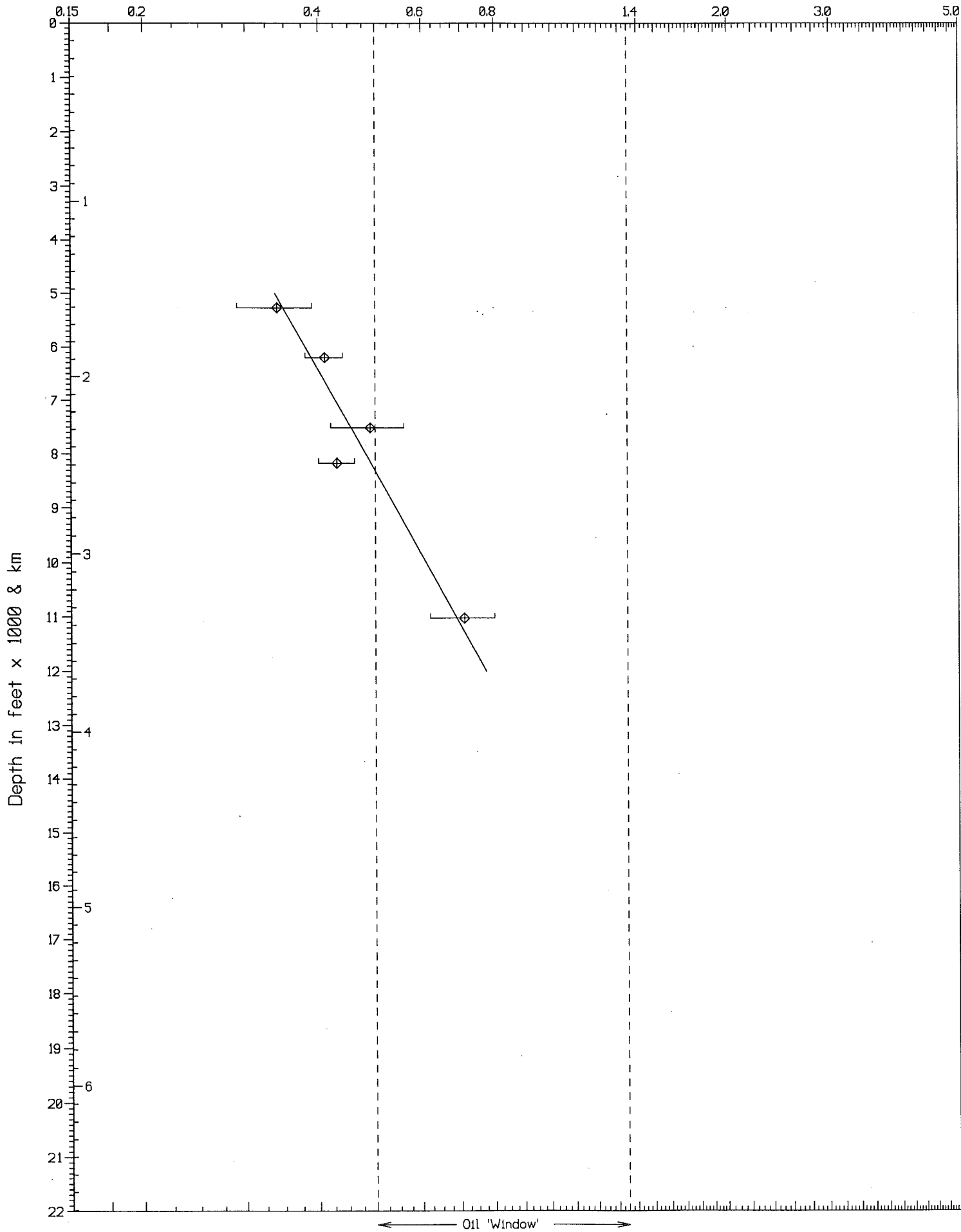


Fig. 6 Terra Nova K-07 (D282)

Vitrinite Reflectance

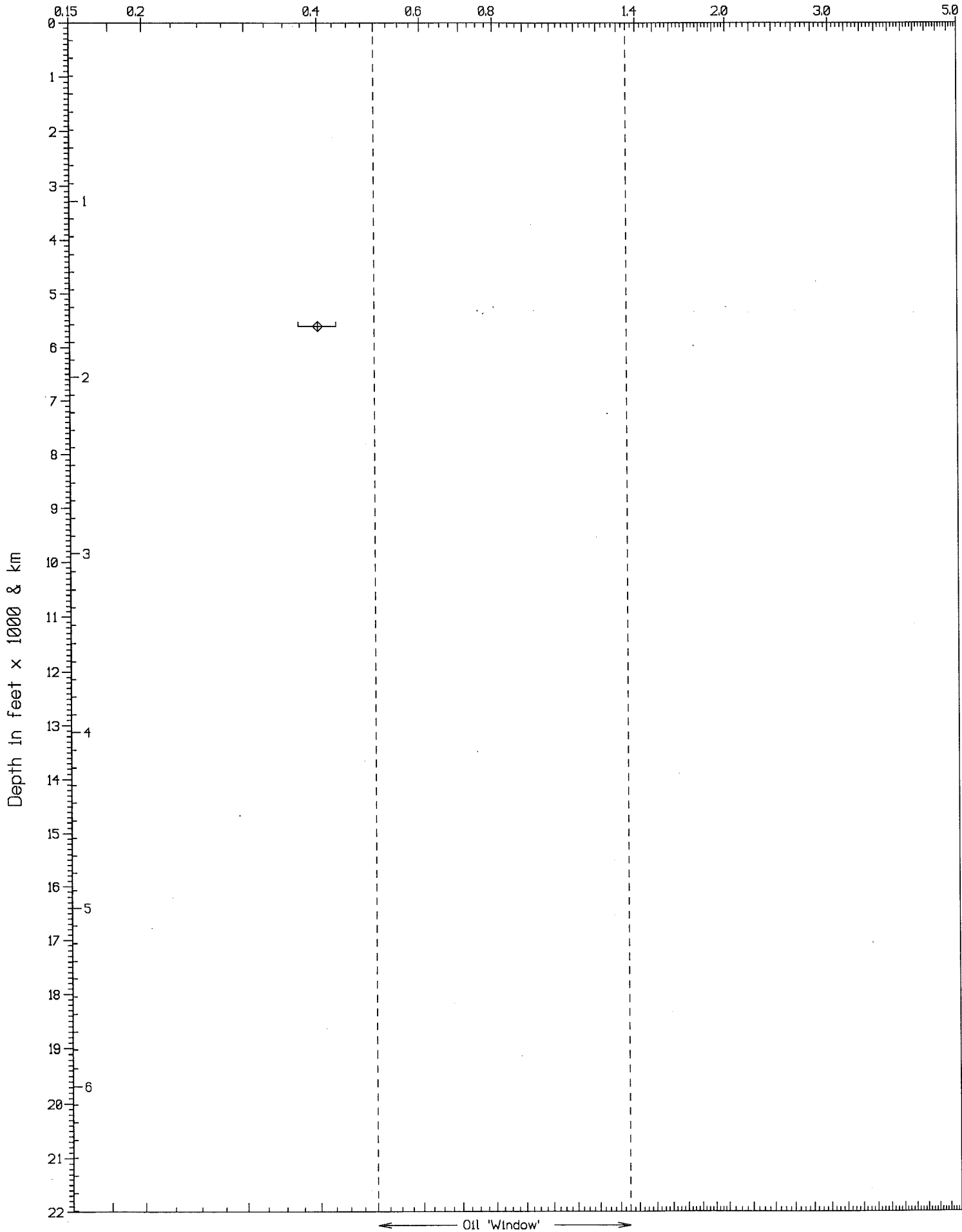


Fig. 8 Terra Nova K-18 (D259)

Vitrinite Reflectance

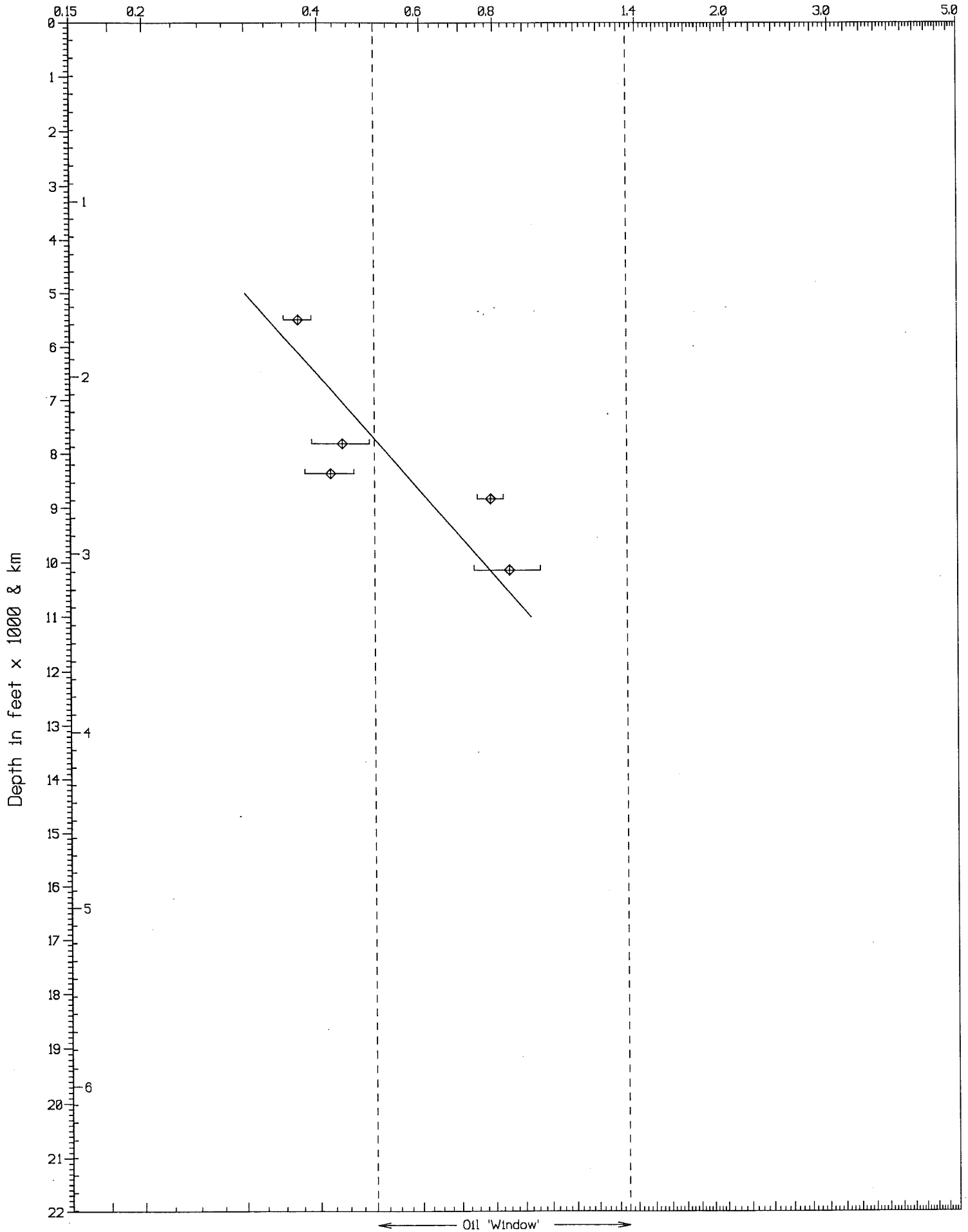


Fig. 7 Terra Nova K-17 (D284)

APPENDIX I

Sample Preparation Method

Whole Rock

Preliminary wash & air dry (by Dalhousie).

Crush to 1mm.

Mold into 1" stub with epoxy resin.

Polish to obtain low relief, scratch free surface.

Examine under oil lens, incident light at approximately 800x mag'n.

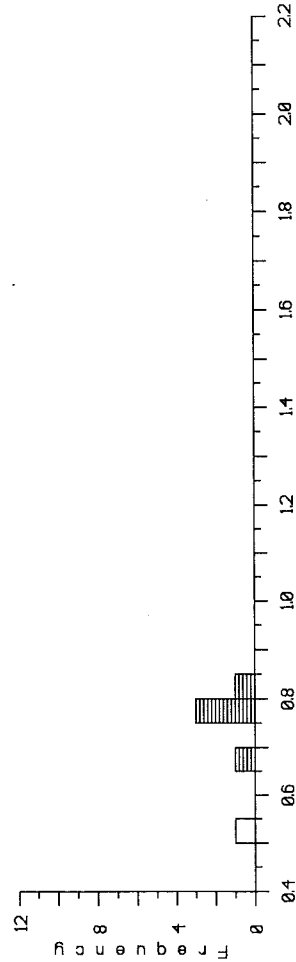
Appendix III
Reflectance Histograms

PH1934, 2970-3020M, Fortune G-57 (D292)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.51	0.69<	0.77<	0.79<	0.79<	0.82<				

Mean	0.73	0.12	0.51	0.51	0.82	4.37				
Stand Dev	0.77	0.05	0.08	0.08	0.82	3.86				
Total			6	6	5					
Edit<			5	5						

Reflectance Histogram

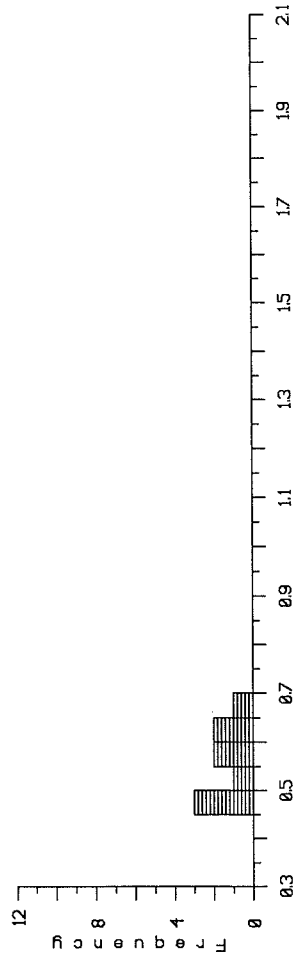


PH1936, 2320-2360M, HIBERNIA B-08 (D191)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.47<	0.47<	0.49<	0.54<	0.56<	0.58<	0.60<	0.62<	0.66<	0

Mean	0.55	0.07	0.47	0.47	0.66	4.99				
Stand Dev	0.55	0.07	0.47	0.47	0.66	4.99				
Total			9	9						
Edit<			9	9						

Reflectance Histogram

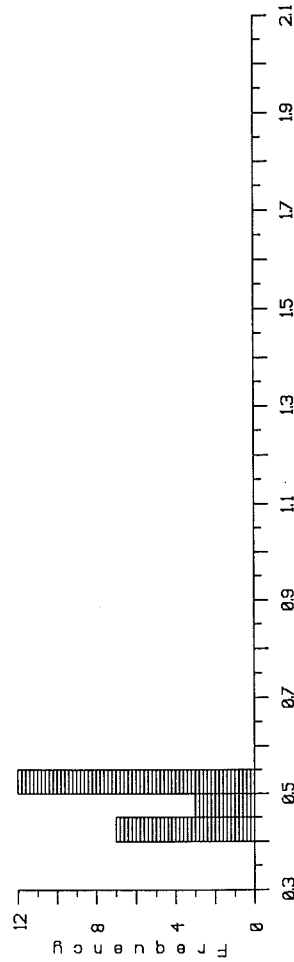


PH1935, 2125-2160M, HIBERNIA B-08 (D191)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.44<	0.44<	0.44<	0.45<	0.45<	0.45<	0.45<	0.48<	0.49<	0.49<
1	0.50<	0.51<	0.51<	0.51<	0.51<	0.51<	0.52<	0.52<	0.52<	0.52<
2	0.53<	0.53<								

Mean	0.49	0.03	0.44	0.44	0.53	10.77				
Stand Dev	0.49	0.03	0.44	0.44	0.53	10.77				
Total			22	22	22					
Edit<			22	22						

Reflectance Histogram

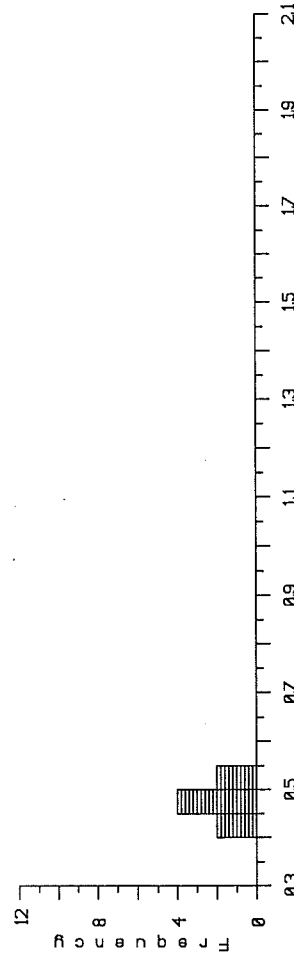


PH1937, 2755-2780M, HIBERNIA B-08 (D191)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.45<	0.45<	0.46<	0.47<	0.48<	0.49<	0.51<	0.51<	0.54<	0

Mean	0.48	0.03	0.45	0.45	0.54	3.85				
Stand Dev	0.48	0.03	0.45	0.45	0.54	3.85				
Total			8	8						
Edit<			8	8						

Reflectance Histogram

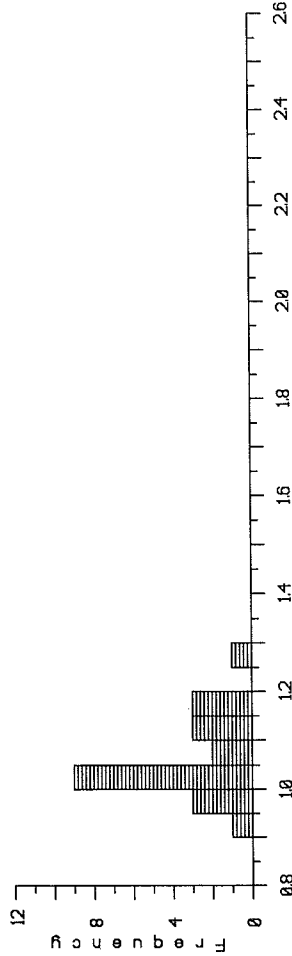


PH1933, 4155-4185M, HIBERNIA B-08 (D191)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.92<	0.96<	0.96<	0.97<	1.00<	1.00<	1.01<	1.02<	1.03<	1.03<
1	1.05<	1.05<	1.05<	1.09<	1.09<	1.11<	1.14<	1.15<	1.17<	1.18<
2	1.18<	1.28<								

Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.07	22	0.92	1.28	23.44
EdtK	1.07	22	0.92	1.28	23.44

Reflectance Histogram

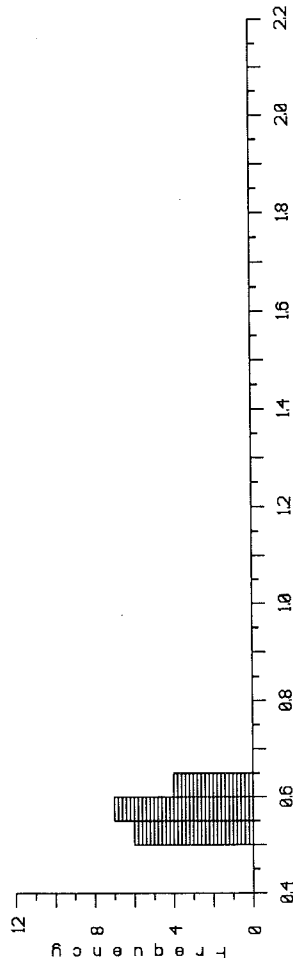


PH1938, 3040-3090M, HIBERNIA B-08 (D191)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.50<	0.50<	0.51<	0.52<	0.52<	0.53<	0.55<	0.55<	0.55<	0.57<
1	0.58<	0.58<	0.59<	0.60<	0.60<	0.60<	0.61<	0.61<	0.61<	0.61<

Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.64	17	0.50	0.61	9.46
EdtK	0.64	17	0.50	0.61	9.46

Reflectance Histogram

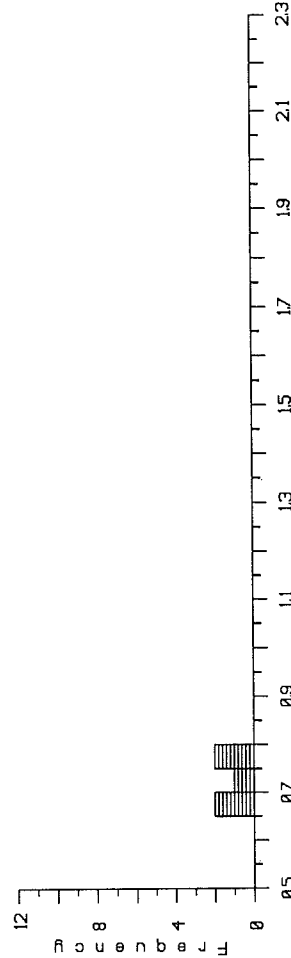


PH1939, 3570-3605M, HIBERNIA B-08 (D191)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.69<	0.70<	0.73<	0.76<	0.76<	0.76<	0.76<	0.76<	0.76<	0.76<

Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.73	5	0.69	0.76	3.64
EdtK	0.73	5	0.69	0.76	3.64

Reflectance Histogram

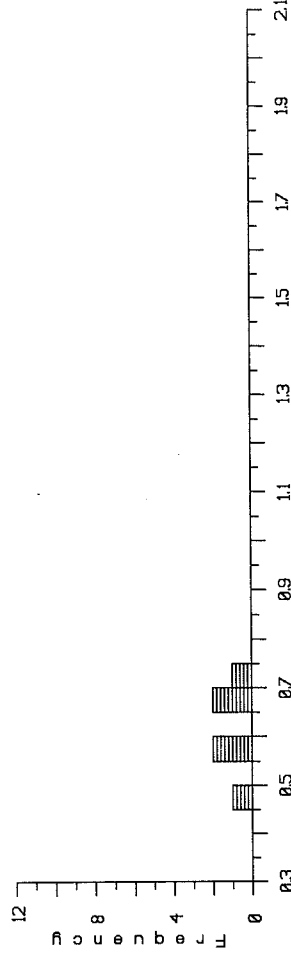


PH1940, 2630-2660M, Hibernia J-34 (D206)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.49<	0.56<	0.56<	0.68<	0.68<	0.72<	0.72<	0.72<	0.72<	0.72<

Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.62	6	0.49	0.72	3.69
EdtK	0.62	6	0.49	0.72	3.69

Reflectance Histogram

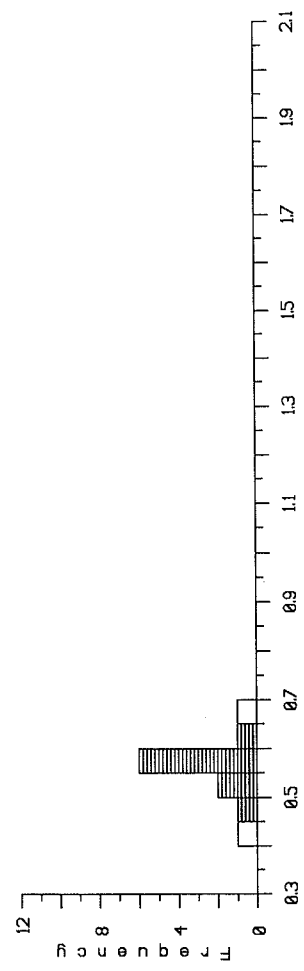


PH1929, 2045-2095M, Rankin M-36 (D2229)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.41	0.49	0.53	0.54	0.55	0.56	0.57	0.57	0.58	0.59
1	0.63	0.70								

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.56	0.07	12	0.41	0.70	6.72
Edit	0.56	0.04	10	0.49	0.63	5.61

Reflectance Histogram

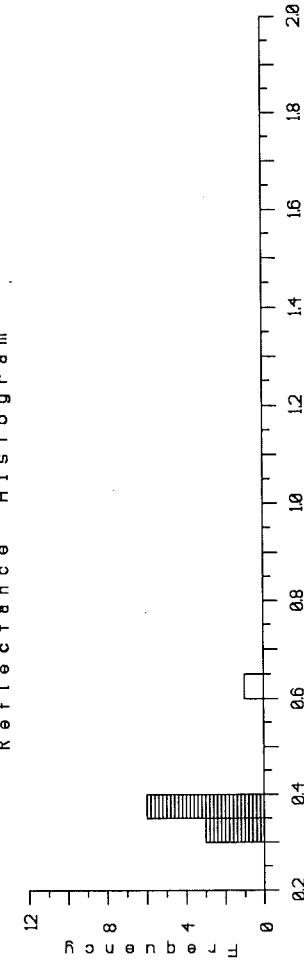


PH1927, 1575-1615M, Rankin M-36 (D2229)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.31	0.32	0.33	0.37	0.37	0.37	0.38	0.38	0.39	0.61
1										

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.38	0.08	10	0.31	0.39	3.83
Edit	0.36	0.03	9	0.31	0.39	3.22

Reflectance Histogram

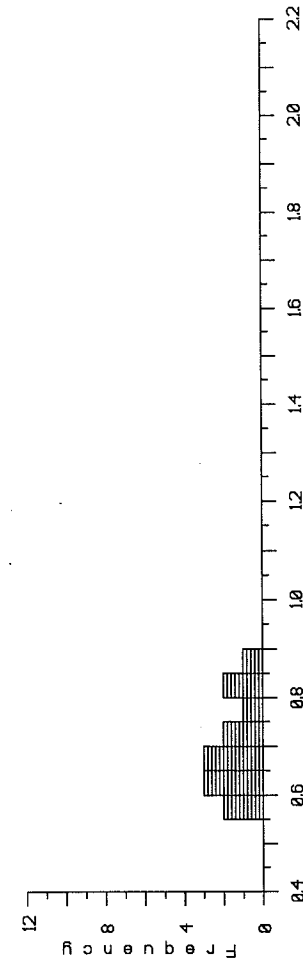


PH1936, 2555-2595M, Rankin M-36 (D2229)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.57	0.59	0.62	0.62	0.65	0.66	0.67	0.68	0.71	0.73
1	0.79	0.80	0.84	0.86						

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.70	0.09	14	0.57	0.86	9.79
Edit	0.70	0.09	14	0.57	0.86	9.79

Reflectance Histogram

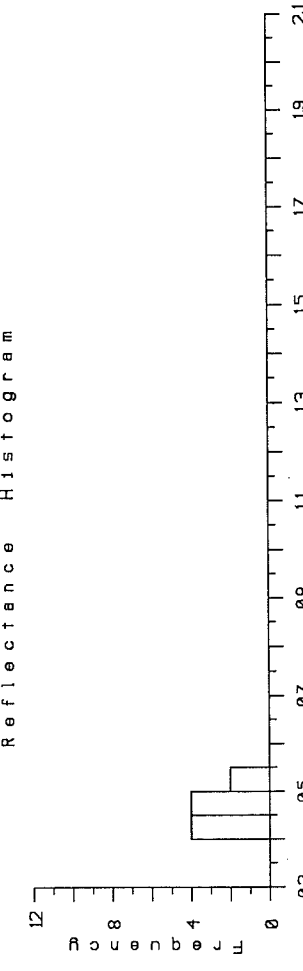


PH1928, 1795-1845M, Rankin M-36 (D2229)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.42	0.43	0.44	0.45	0.46	0.46	0.48	0.49	0.52	0.54
1										

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.47	0.04	10	0.42	0.54	4.69

Reflectance Histogram

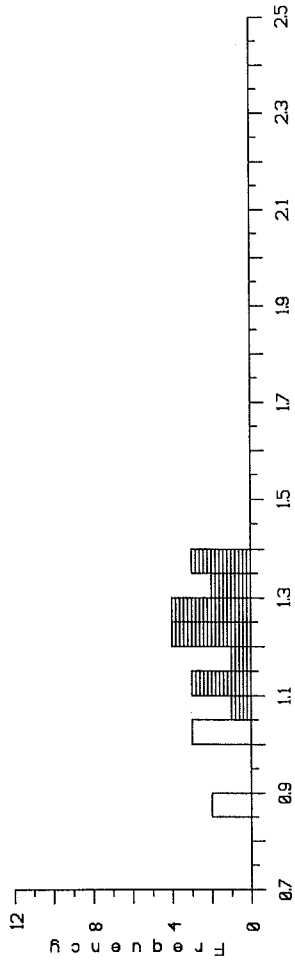


PH1932, 3710-3755M, Rankin M-36 (D2229)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.86	0.90	1.00	1.01	1.03	1.09	1.12	1.13	1.15	1.19
1	1.21	1.21	1.24	1.24	1.26	1.26	1.28	1.30	1.31	1.32
2	1.35	1.35	1.39							

Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.18	23	0.86	1.39	27.20
Edit<	1.24	18	1.09	1.39	22.40

Reflectance Histogram

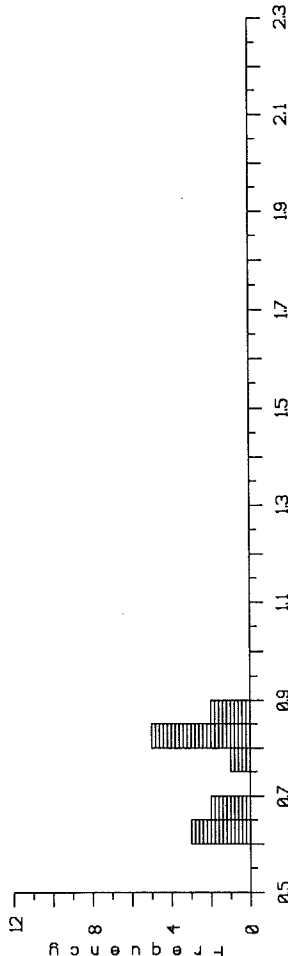


PH1941, 2760-2820M, Rankin M-36 (D2229)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.60	0.65	0.65	0.67	0.67	0.78	0.80	0.80	0.82	0.82
1	0.82	0.85	0.88							

Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.75	13	0.60	0.88	9.81
Edit<	0.75	13	0.60	0.88	9.81

Reflectance Histogram

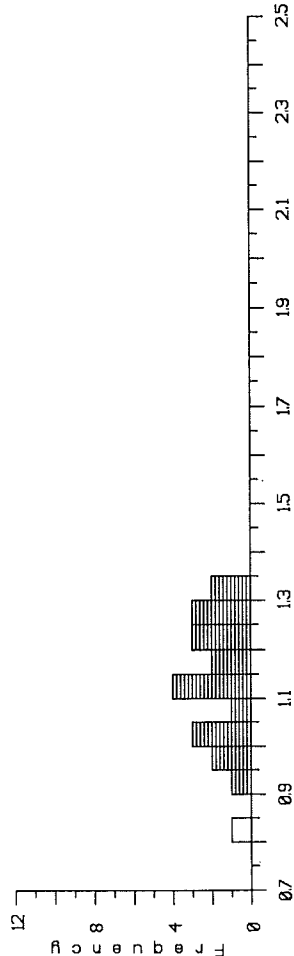


PH1931, 3440-3485M, Rankin M-36 (D2229)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.80	0.93	0.98	0.99	1.03	1.04	1.05	1.09	1.10	1.10
1	1.12	1.14	1.16	1.19	1.21	1.21	1.23	1.25	1.26	1.28
2	1.31	1.32								

Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.13	22	0.80	1.32	24.79
Edit<	1.14	21	0.93	1.32	23.99

Reflectance Histogram

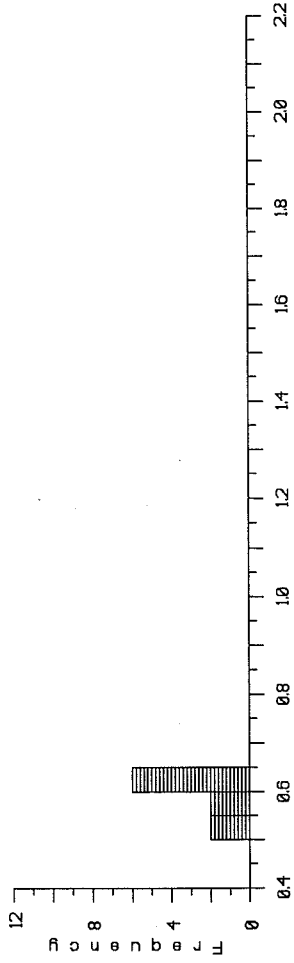


PH1942, 2240-2260M, Terra Nova I-97 (D291)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.53	0.54	0.57	0.59	0.60	0.61	0.62	0.62	0.62	0.64
1										

Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.59	10	0.53	0.64	5.94
Edit<	0.59	10	0.53	0.64	5.94

Reflectance Histogram

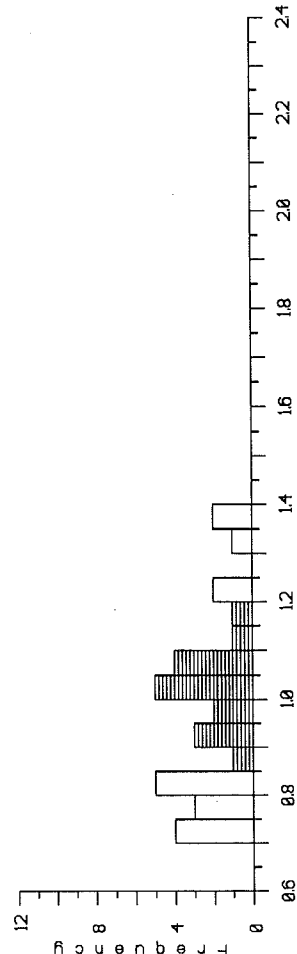


PH1943, 3300-3320M, Terra Nova I-97 (0291)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.72	0.74	0.74	0.74	0.75	0.77	0.78	0.80	0.81	0.81
1	0.82	0.83	0.89	0.91	0.91	0.93	0.96	0.97	1.00	1.01
2	1.02	1.03	1.04	1.06	1.07	1.08	1.09	1.14	1.16	1.20
3	1.22	1.31	1.36	1.38						

Total	Mean	Stand Dev	Pts	Min	Max	Sum
EdtK	1.02	0.08	34	0.72	1.38	33.05
			17	0.89	1.16	17.27

Reflectance Histogram

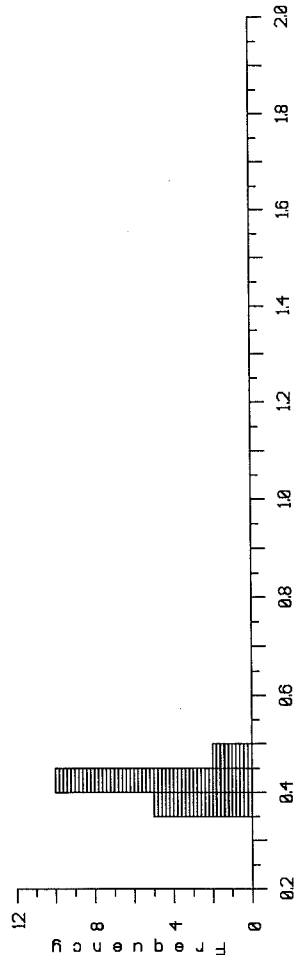


PH1951, 1870-1890M, Terra Nova K-07 (0282)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.37	0.37	0.39	0.39	0.39	0.40	0.40	0.40	0.41	0.41
1	0.42	0.42	0.42	0.43	0.44	0.47	0.47	0.48	0.48	0.48

Total	Mean	Stand Dev	Pts	Min	Max	Sum
EdtK	0.41	0.03	17	0.37	0.47	7.00
			17	0.37	0.47	7.00

Reflectance Histogram

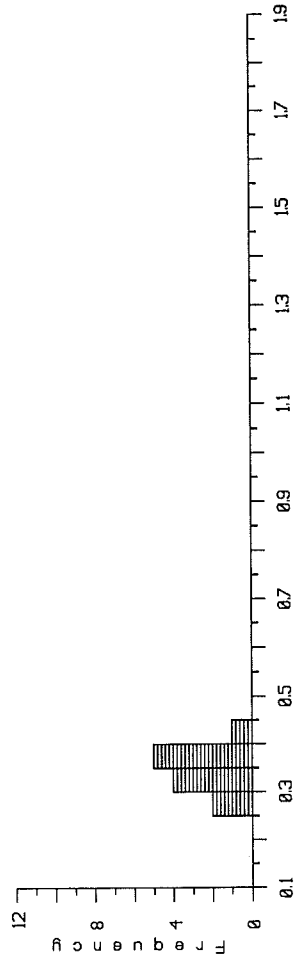


PH1950, 1585-1605M, Terra Nova K-07 (0282)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.25	0.29	0.30	0.30	0.31	0.35	0.36	0.36	0.38	0.38
1	0.38	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40

Total	Mean	Stand Dev	Pts	Min	Max	Sum
EdtK	0.34	0.05	12	0.25	0.40	4.06
	0.34	0.05	12	0.25	0.40	4.06

Reflectance Histogram

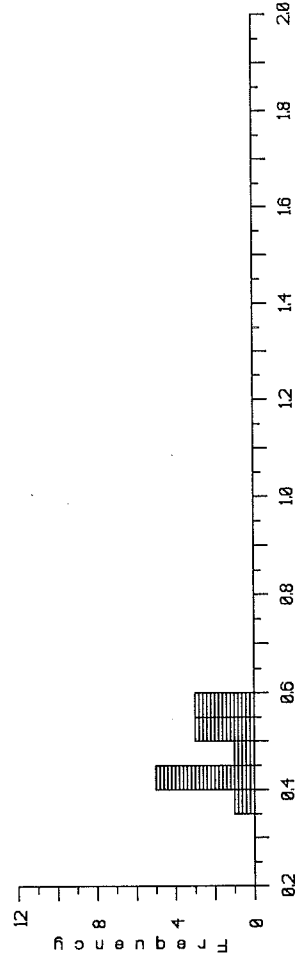


PH1952, 2275-2290M, Terra Nova K-07 (0282)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.38	0.41	0.42	0.43	0.44	0.45	0.48	0.51	0.53	0.54
1	0.58	0.57	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58

Total	Mean	Stand Dev	Pts	Min	Max	Sum
EdtK	0.49	0.07	13	0.38	0.58	6.31
	0.49	0.07	13	0.38	0.58	6.31

Reflectance Histogram

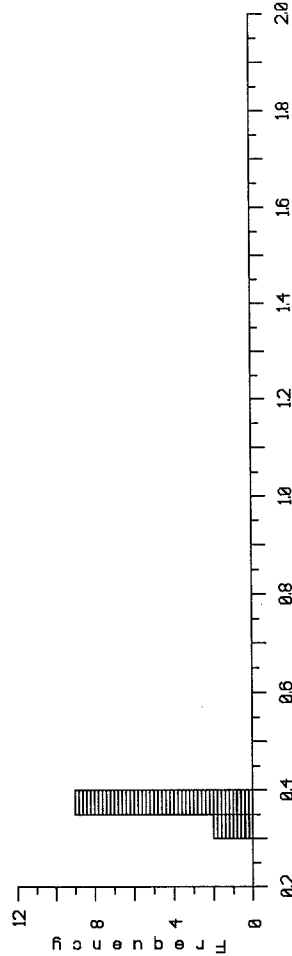


PH1945, 1645-1675M, Terra Nova K-17 (D284)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.33<	0.34<	0.36<	0.36<	0.36<	0.37<	0.37<	0.38<	0.38<	0.38<
1	0.39<									

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.37	0.02	11	0.33	0.39	4.03
EditK	0.37	0.02	11	0.33	0.39	4.03

Reflectance Histogram

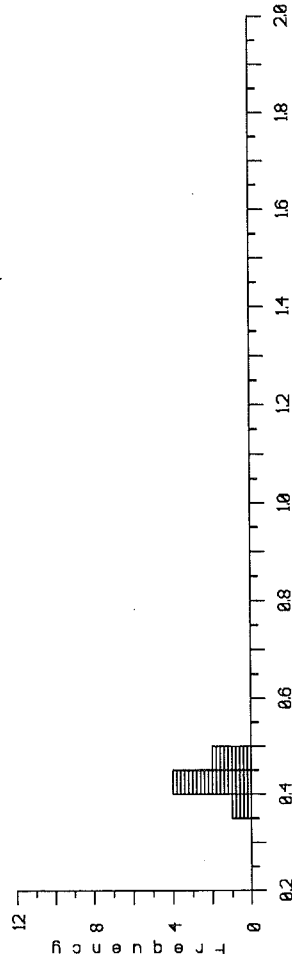


PH1953, 2478-2490M, Terra Nova K-07 (D282)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.39<	0.42<	0.42<	0.43<	0.44<	0.46<	0.48<			

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.43	0.03	7	0.39	0.48	3.04
EditK	0.43	0.03	7	0.39	0.48	3.04

Reflectance Histogram

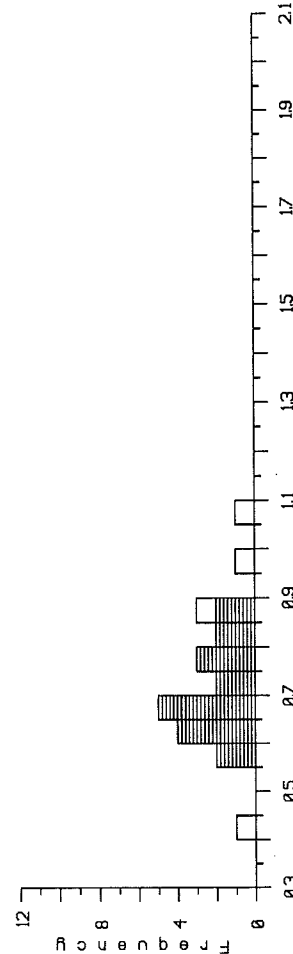


PH1954, 3335-3360M, Terra Nova K-07 (D282)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.41	0.58<	0.58<	0.60<	0.62<	0.63<	0.64<	0.67<	0.69<	0.70<
1	0.70<	0.70<	0.72<	0.72<	0.76<	0.77<	0.79<	0.82<	0.83<	0.85<
2	0.86<	0.89	0.99	1.06						

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.73	0.14	24	0.41	1.06	17.58
EditK	0.71	0.09	20	0.58	0.86	14.23

Reflectance Histogram

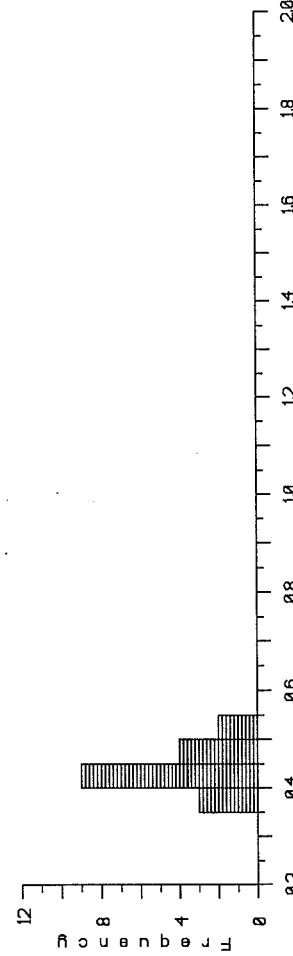


PH1946, 2345-2380M, Terra Nova K-17 (D284)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.36<	0.37<	0.39<	0.40<	0.41<	0.41<	0.41<	0.42<	0.43<	0.45<
1	0.45<	0.45<	0.46<	0.46<	0.46<	0.49<	0.50<	0.54<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.44	0.05	18	0.36	0.54	7.86
EditK	0.44	0.05	18	0.36	0.54	7.86

Reflectance Histogram

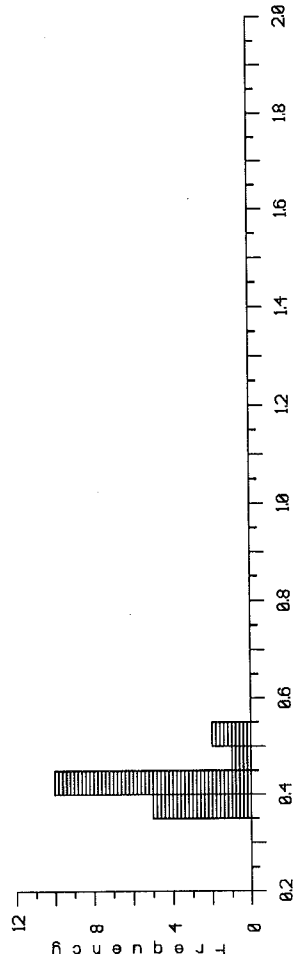


PH1947, 2515-2550M, Terra Nova K-17 (D284)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.38<	0.37<	0.38<	0.38<	0.38<	0.40<	0.40<	0.41<	0.41<	0.41<
1	0.42<	0.43<	0.43<	0.45<	0.45<	0.48<	0.51<	0.51<	0.51<	0.51<

Total	Mean	Stand Dev	Pts	Min	Max	Sum
1	0.42	0.04	18	0.36	0.51	7.58
Edit<	0.42	0.04	18	0.36	0.51	7.58

Reflectance Histogram

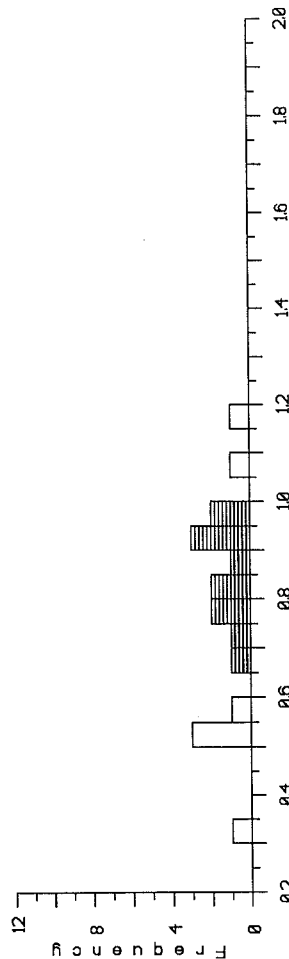


PH1949, 3060-3090M, Terra Nova K-17 (D284)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.31	0.52	0.53	0.53	0.55	0.67<	0.71<	0.75<	0.78<	0.81<
1	0.84<	0.85<	0.82<	0.93<	0.94<	0.97<	0.99<	1.06	1.18	1.18

Total	Mean	Stand Dev	Pts	Min	Max	Sum
1	0.78	0.22	19	0.31	1.18	14.04
Edit<	0.85	0.11	12	0.67	0.99	10.16

Reflectance Histogram

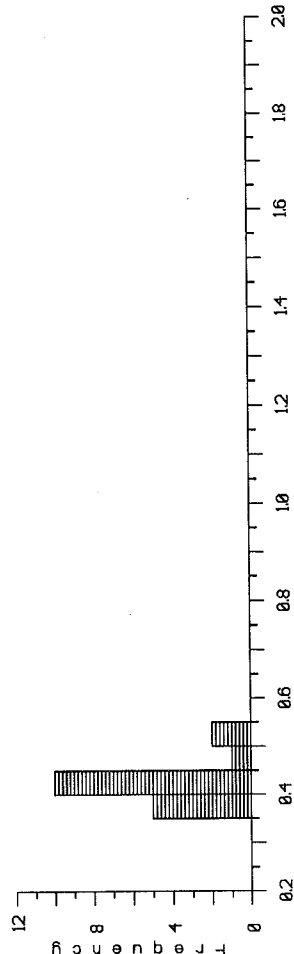


PH1948, 2660-2690M, Terra Nova K-17 (D284)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.50	0.53	0.73<	0.74<	0.79<	0.81<	0.82<	0.82<	0.82<	0.82<
1	0.72	0.13	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

Total	Mean	Stand Dev	Pts	Min	Max	Sum
1	0.72	0.13	8	0.50	0.82	5.74
Edit<	0.79	0.04	6	0.73	0.82	4.71

Reflectance Histogram



PH1944, 1690-1710M, Terra Nova K-18 (D259)

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.34<	0.36<	0.37<	0.38<	0.38<	0.38<	0.39<	0.40<	0.40<	0.40<
1	0.40<	0.40<	0.42<	0.44<	0.48<	0.48<	0.48<	0.48<	0.48<	0.48<

Total	Mean	Stand Dev	Pts	Min	Max	Sum
1	0.40	0.03	15	0.34	0.48	5.94
Edit<	0.40	0.03	15	0.34	0.48	5.94

Reflectance Histogram

