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Vitrinite reflectance (Ro) of dispersed organics from thirteen **Scotian Shelf wells**

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Geological Survey of Canada
Commission géologique du Canada

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Vitrinite reflectance has been determined on drill cuttings samples from thirteen wells on the Scotian Shelf approximately 300km east southeast of Halifax, Nova Scotia (Table I, Table IIa-m). These samples were measured to take advantage of sampling done by contractor (Dr. P.K. Mukhopadhyay) and to mesh with his organic petrography studies of samples hand-picked from possible hydrocarbon source rock intervals.

Sample preparation followed the procedure for kerogen listed in Appendix I. VR data for this report was gathered using a Zeiss Photometer III system with a custom microcomputer interface providing on-line data acquisition and statistical summaries.

Table I
Well information

Well	GSC Loc #	Location	Total Depth	Water Depth
Bluenose 2G-47	D223	44°06'22.30"N 59°21'23.05"W	5797m	85m
Citadel H-52	D260	44°11'25.07"N 58°52'39.87"W	5666m	65m
Eagle D-21	D080	43°50'06.73"N 59°34'09.21"W	4660m	51.2m
Intrepid L-80	D126	43°49'35.78"N 59°56'43.83"W	4162m	43.6m
Merigomish C-52	D276	43°31'02.65"N 60°38'33.76"W	3950m	75m
North Triumph B-52	D289	43°41'02.3 "N 59°52'56.7 "W	3960m	81m
Onondaga B-96	D158	43°45'08.23"N 60°14'09.63"W	3758m	60.4m
Sable Island C-67	D001	43°56'04.91"N 59°55'01.38"W	4604m	4m *
South Desbarres O-76	D250	44°05'56.06"N 59°55'59.01"W	6039m	69m
South Venture O-59	D217	44°03'15.62"N 58°50'21.60"W	6309m	113.7m
Thebaud I-93	D271	43°52'44.54"N 60°13'50.94"W	5166m	30m
Venture D-23	D178	44°02'14.86"N 59°34'24.72"W	4945m	20.1m
Wenonah J-75	D164	43°34'32.95"N 60°26'16.90"W	3670m	66.8m

* This well was drilled on Sable Island and the Water Depth value given is actually an elevation above sealevel.

Remarks

The data (Tables IIa-m) are plotted on a log Ro vs. linear depth scale (Figures 1-11). The maturation slopes were determined by the least squares method.

For some wells, earlier reports exist for the same or proximal wells. Data from these reports are plotted along with the new data. The new data from several comparison wells have significantly lower reflectance values. In general reflectance on vitrinite obtained from shale samples are lower then other lithologies (Mukhopadhyay, 1992). The discrepancy in the Sable Island plot may also be explained because the comparison well is a proximal well and may not be from an identical geological setting. The data for Eagle and Wenonah wells were measured in 1986 and may reflect a change in the criteria for selection of the in-situ vitrinite.

The specific maturation levels, as set out in this report, are slightly modified from terminology used by Dow (1977; Appendix II).

Bluenose 2G-47

A maturation slope of 0.161 log Ro/km has been calculated for the section covered by this new data set (Table IIa; Figure 1). The four points cover only a short section of the bottom of the well from 4830 to 5797m. For comparison, the data points and maturation slope (0.140 log Ro/km) previously reported for this well are plotted (Avery 1993a). Most of the line falls below the 'oil window' and only the top data point plots within the 'window'.

Citadel H-52

Only one data point at 5620m has been measured for this well and it falls below the 'oil window' (Table IIb; Figure 2).

Eagle D-21

A maturation slope of 0.119 log Ro/km has been calculated for the section covered by this new data set (Table IIc; Figure 3). The four data points give limited coverage of the lower section of the well from 11670 to 15290' (3557-4660m). This data set plots within the 'oil window'. For comparison, the data points and maturation slope (0.160 log Ro/km) previously reported for this well (Avery 1986a) are plotted.

Intrepid L-80

A maturation slope of 0.092 log Ro/km has been calculated for the section covered by this new data set (Table IId; Figure 4). The four data points give limited coverage of the lower section of the well from 9680 to 12940' (2950-3944m) and fall just below the top of the 'oil window'.

Merigomish C-52

A maturation slope of 0.225 log Ro/km has been calculated for the section covered by this new data set (Table IIe; Figure 5). The six data points give limited coverage of the lower section of the well from 2690 to 3950m and fall within the 'oil window' except the shallowest point which plots above the window.

North Triumph B-52

Only one data point at 3774m has been measured for this well and it falls within the 'oil window' (Table IIf; Figure 6).

Onondaga B-96

A maturation slope of 0.129 log Ro/km has been calculated for the section covered by this new data set (Table IIg; Figure 7). The four data points give limited coverage of the section of the well from 8700 to 13085' (2652-3988m) and fall within the 'oil window'.

Sable Island C-67

A maturation slope of 0.116 log Ro/km has been measured for the section covered by this new data set (Table IIh; Figure 8). The four data points give limited coverage of the section of the well from 9700 to 15106' (2957-4604m). The maturation curve indicates this section of the well lies within the 'oil window'. For comparison, the previously reported data points for the nearby Sable Island 4H-58 well with a maturation slope of 0.181 log Ro/km are also plotted (unpublished internal report; Avery 1978) .

South Desbarres O-76

Two data points have been measured for the section covered by this new data set (Table IIi; Figure 9). These points somewhat support and add to the previously reported Ro data for this well (Avery, 1993b). The previous data had a maturation slope of 0.184 log Ro/km. Both of the new data points fall within the 'oil window'.

South Venture O-59

A maturation slope of 0.122 log Ro/km has been calculated for the section covered by this new data set (Table IIj; Figure 10). The four data points give limited coverage of the section of the well from 4475 to 6176m. The previously reported data for this well are also plotted (unpublished internal report; Avery, 1984). Two maturation slopes were calculated for this older data set with a lower slope value of 0.296 log Ro/km. The new maturation curve indicates that the lower section progresses from the middle of the 'oil window' to just beyond the 'window' to about 2% reflectance.

Thebaud I-93

A maturation slope of 0.276 log Ro/km has been calculated for the section covered by this new data set (Table IIk; Figure 11). The five data points give limited coverage of the lower section of the well from 3915 to 5000m. The maturation curve shown here indicates this section lies mostly within the 'oil window'.

Venture D-23

Only one data point at 2750m has been measured for this well and it falls just above the top of the 'oil window' (Table III; Figure 12).

Wenonah J-75

A maturation slope of 0.123 log Ro/km has been calculated for the section covered by this new data set (Table IIm; Figure 13). The four data points give limited coverage of the lower section of the well from 8630 to 12040m . A previously reported data set for this well is also plotted (Avery 1986b). The previous data had a maturation slope of 0.199 log Ro/km. The maturation curve shown here indicates this section lies within the 'oil window'.

References

Avery, M.P., 1986a. Vitrinite Reflectance (Ro) of dispersed organics from Shell Mobil-Tetco Eagle D-21. Geological Survey of Canada, Open File 1348.

Avery, M.P., 1986b. Vitrinite Reflectance (Ro) of dispersed organics from Petro-Canada Shell Wenonah J-75. Geological Survey of Canada, Open File 1424.

Avery, M.P., 1993a. Vitrinite Reflectance (Ro) of dispersed organics from dispersed organics from Mobil et al Bluenose 2G-47. Geological Survey of Canada, Open File 2707.

Avery, M.P., 1993b. Vitrinite Reflectance (Ro) of dispersed organics from dispersed organics from Shell PCI et al South Desbarres O-76. Geological Survey of Canada, Open File 2706.

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Mukhopadhyay, P.K., 1992. Maturation of Organic Matter as Revealed by Microscopic Methods: Applications and Limitions of Vitrinite Reflectance, and Continuous Spectral and Pulsed Laser Fluorescence Spectroscopy. In: Wolf, K.H., Chilingarian, G.V. (Editors), Diagenesis, III. Developments in Sedimentology, 47. Elsevier, Amsterdam, pp. 435-510.

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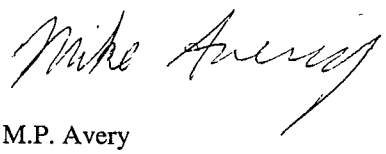

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Table IIa Summary of kerogen-based vitrinite reflectance for **Bluenose 2G-47**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0871A	4730-4830	1.09(±.06)	22 (13)
2	K0871B	5050-5225	1.39(±.10)	6 (6)
3	K0871C	5260-5500	1.38(±.11)	10 (10)
4	K0871D	5695-5797	1.52(±.11)	6 (6)

Table IIb Summary of kerogen-based vitrinite reflectance for **Citadel H-52**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0872A	5500-5620	1.81(±.12)	33 (33)

Table IIc Summary of kerogen-based vitrinite reflectance for **Eagle D-21**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0864A	10800-11670	0.58(±.06)	27 (27)
2	K0864B	11800-12600	0.70(±.08)	30 (30)
3	K0864C	13400-14400	0.76(±.11)	24 (24)
4	K0864D	14550-15290	0.81(±.08)	30 (30)

Table IId Summary of kerogen-based vitrinite reflectance for **Intrepid L-80**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0865A	9280-9680	0.58(±.05)	26 (26)
2	K0865B	10750-11250	0.63(±.04)	21 (21)
3	K0865C	11575-12400	0.68(±.09)	29 (28)
4	K0865D	12400-12940	0.72(±.08)	27 (27)

Table IIe Summary of kerogen-based vitrinite reflectance for **Merigomish C-52**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0875A	2515-2690	0.48(±.05)	16 (16)
2	K0875B	2750-2895	0.60(±.11)	14 (14)
3	K0875C	3000-3200	0.69(±.07)	28 (28)
4	K0875D	3250-3500	0.79(±.04)	8 (8)
5	K0876A	3525-3700	0.82(±.04)	13 (11)
6	K0876B	3730-3950	0.99(±.08)	18 (15)

Table IIf Summary of kerogen-based vitrinite reflectance for **North Triumph B-52**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	PH1960	3773.5	0.63(±.02)	33 (33)

Table IIg Summary of kerogen-based vitrinite reflectance for **Onondaga B-96**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0866A	8100-8700	0.50(±.05)	25 (25)
2	K0866B	9200-9750	0.50(±.05)	24 (24)
3	K0866C	11890-12000	0.67(±.07)	40 (40)
4	K0866D	12000-13085	0.71(±.09)	36 (36)

Table IIh Summary of kerogen-based vitrinite reflectance for **Sable Island C-67**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0863A	9090-9700	0.51(±.04)	23 (23)
2	K0863B	11050-11800	0.61(±.05)	26 (26)
3	K0863C	13100-13600	0.65(±.05)	21 (21)
4	K0863D	14000-15106	0.82(±.09)	28 (28)

Table IIi Summary of kerogen-based vitrinite reflectance for **South Desbarres O-76**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	PH1961	3801.8-3801.9	0.85(±.08)	28 (28)
2	PH1959	3938.31	0.60(±.04)	29 (29)

Table IIj Summary of kerogen-based vitrinite reflectance for **South Venture O-59**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0870A	4340-4475	0.78(±.07)	22 (22)
2	K0870B	4475-4610	0.84(±.07)	18 (18)
3	K0870C	4895-5035	1.13(±.06)	20 (20)
4	K0870D	5865-6176	1.97(±.11)	19 (19)

Table IIk Summary of kerogen-based vitrinite reflectance for **Thebaud I-93**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0873A	3835-3915	0.68(±.08)	31 (31)
2	K0873B	4115-4310	0.81(±.07)	23 (23)
3	K0873C	4410-4625	0.96(±.12)	30 (30)
4	K0873D	4665-4850	1.04(±.12)	7 (7)
5	K0874A	4860-5000	1.49(±.09)	3 (3)

Table III Summary of kerogen-based vitrinite reflectance for **Venture D-23**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0869A	2700-2750	0.45(±.05)	21 (21)

Table IIm Summary of kerogen-based vitrinite reflectance for **Wenonah J-75**

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total (Edited)
1	K0867A	8230-8630	0.58(±.08)	17 (17)
2	K0867B	8630-9060	0.67(±.07)	28 (28)
3	K0867C	9200-10000	0.72(±.07)	28 (28)
4	K0867D	10600-11400	0.77(±.07)	35 (35)
5	K0868A	11400-12040	0.82(±.08)	29 (29)

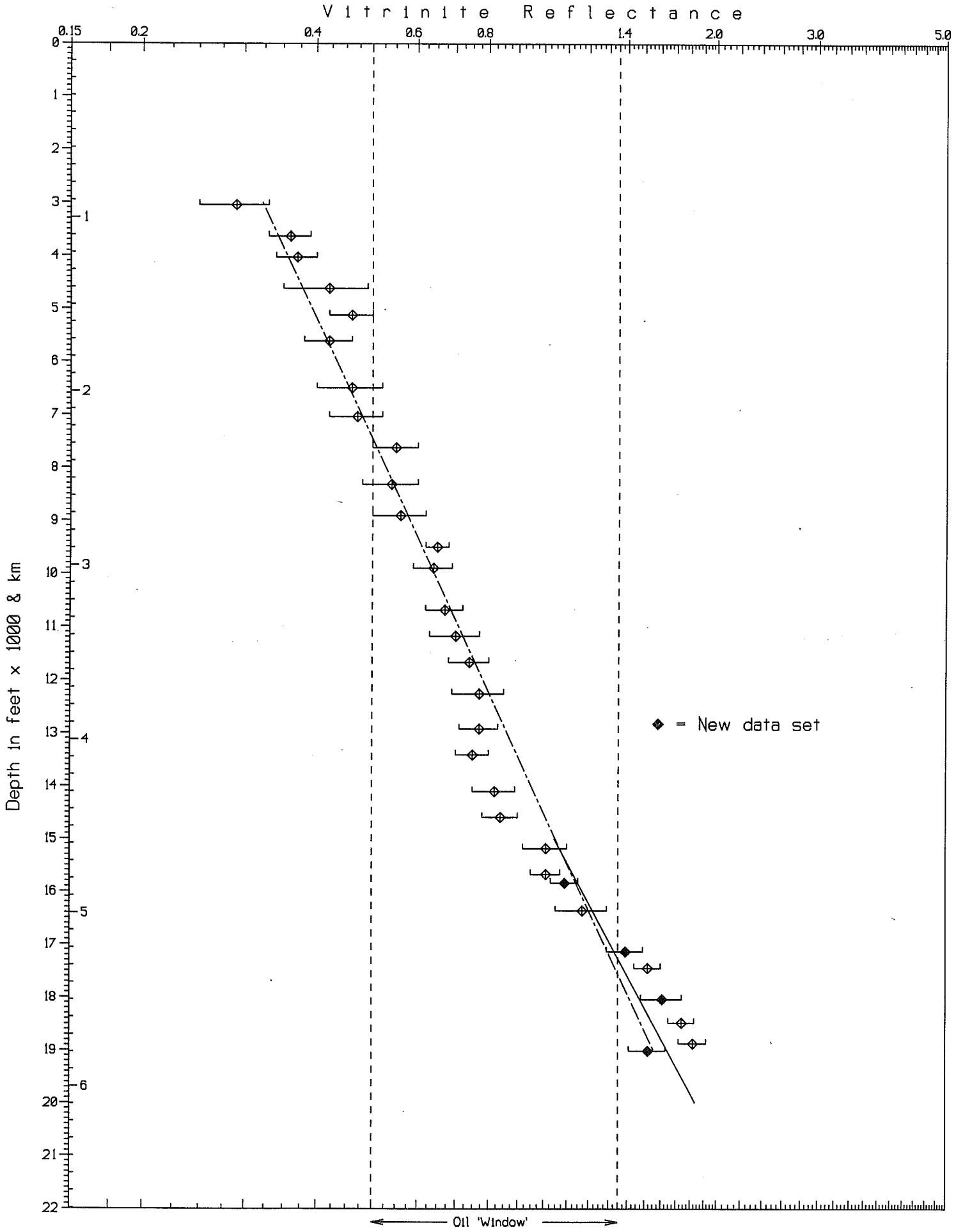


Fig. 1 Bluenose 2G-47

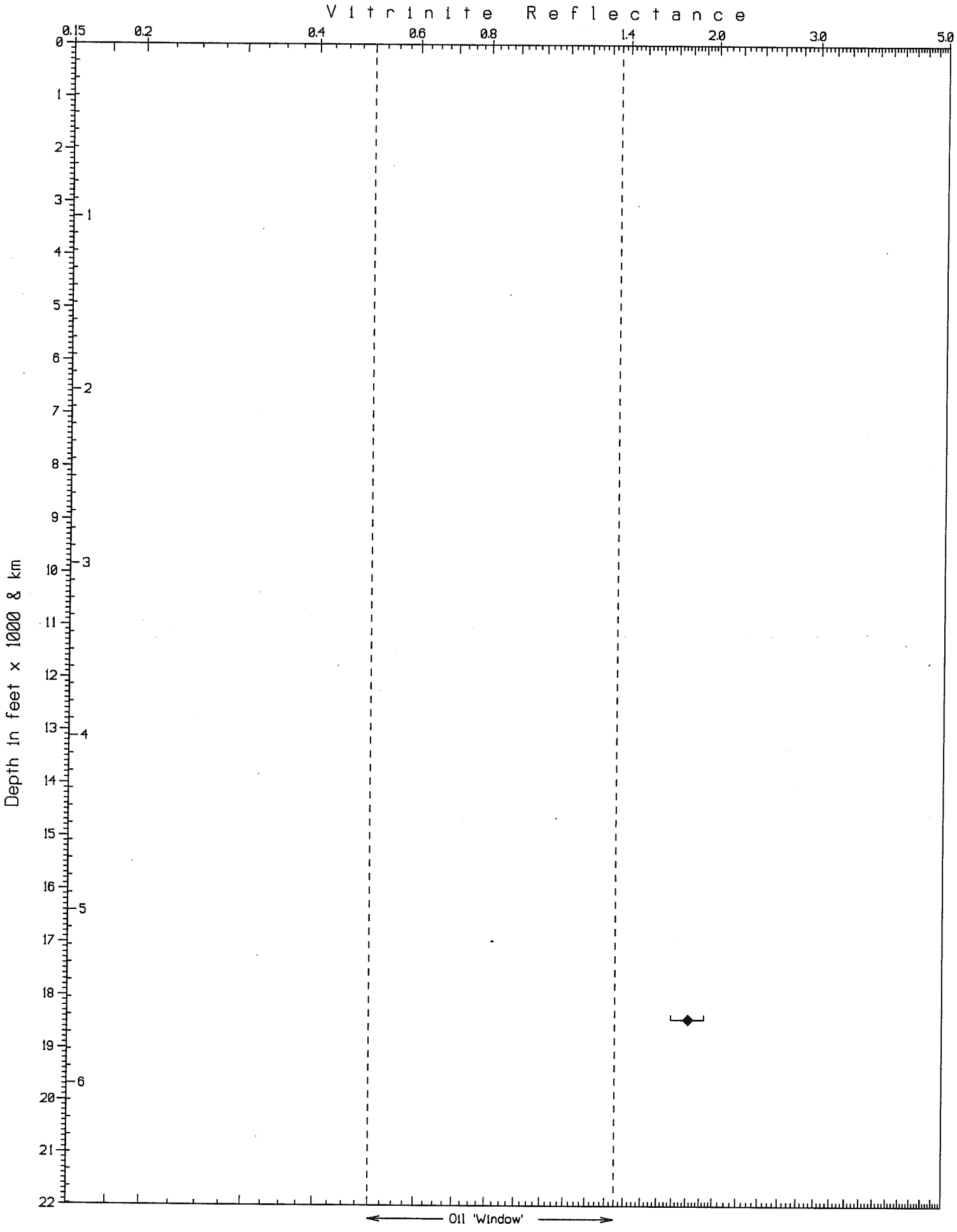


Fig. 2 Citadel H-52

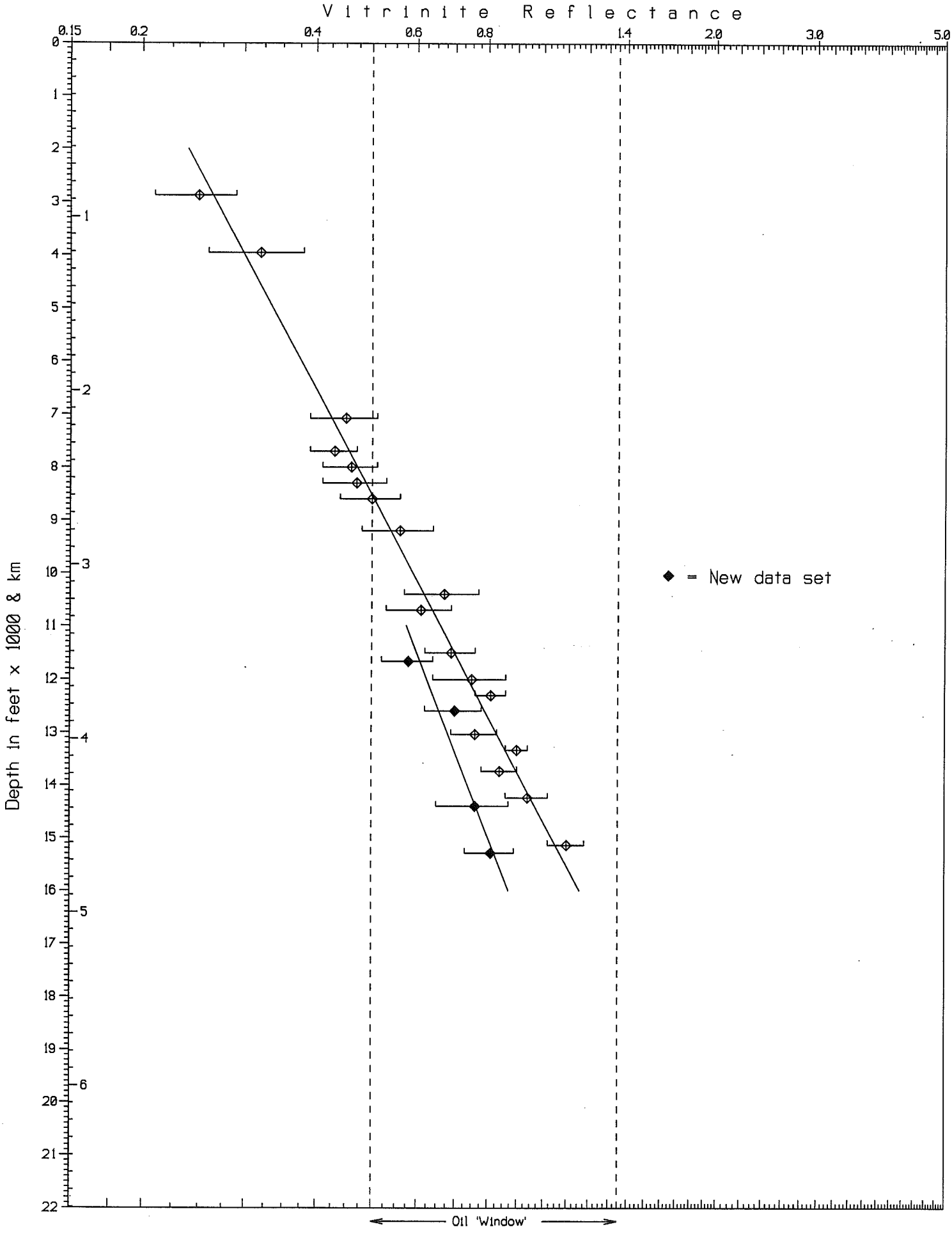


Fig. 3 Eagle D-21

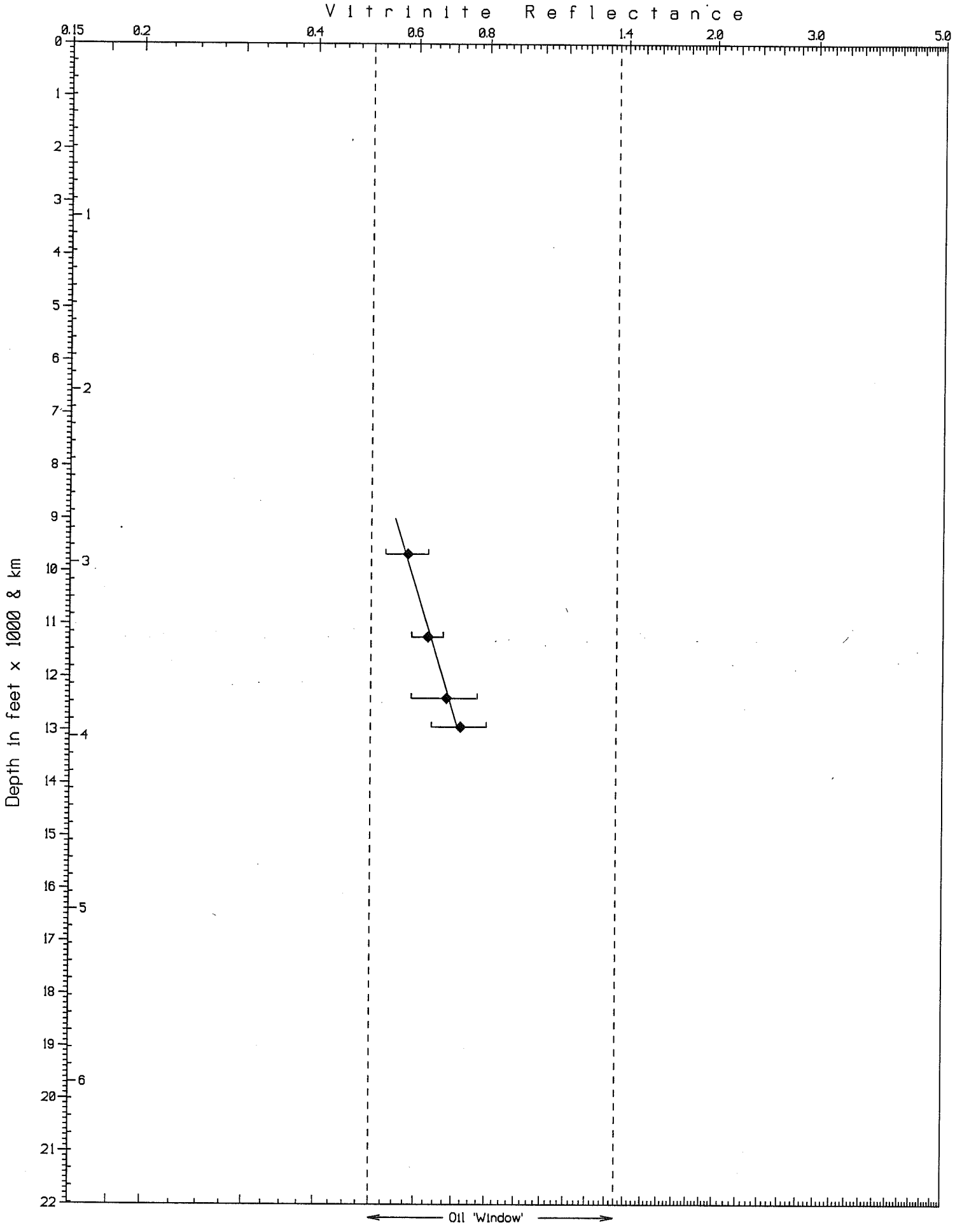


Fig. 4 Intrepid L-80

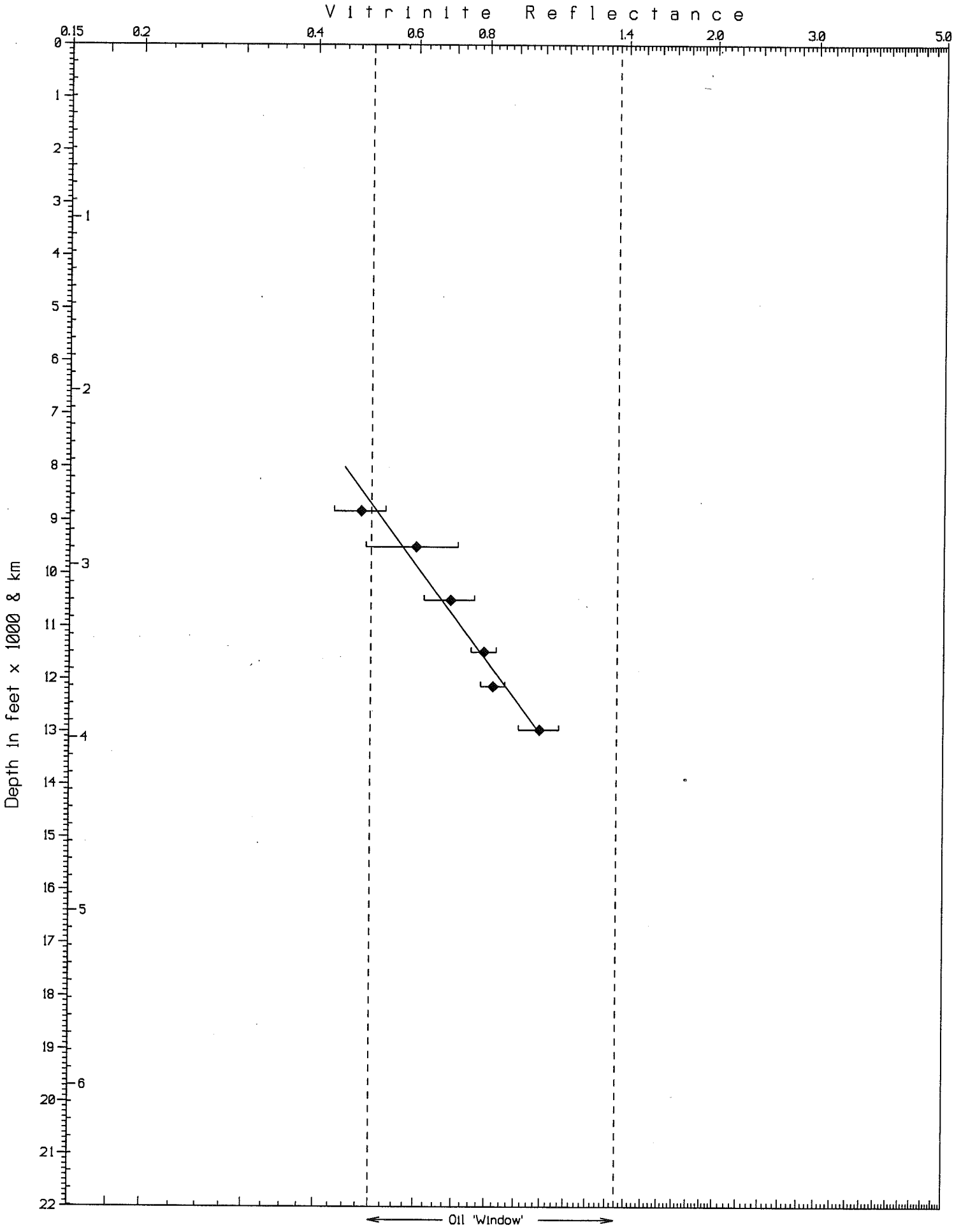


Fig. 5 Merigomish C-52

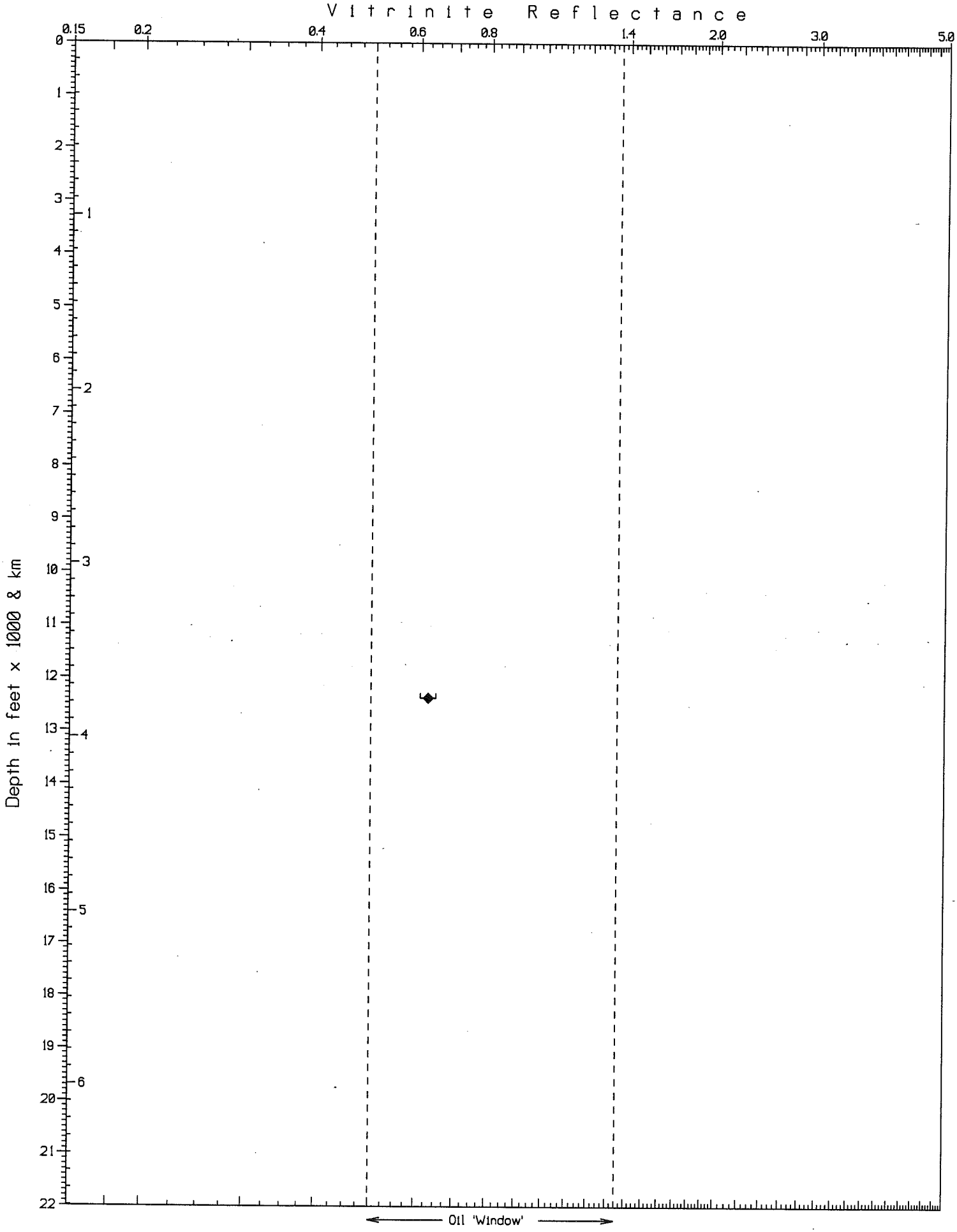


Fig. 6 North Triumph B-52

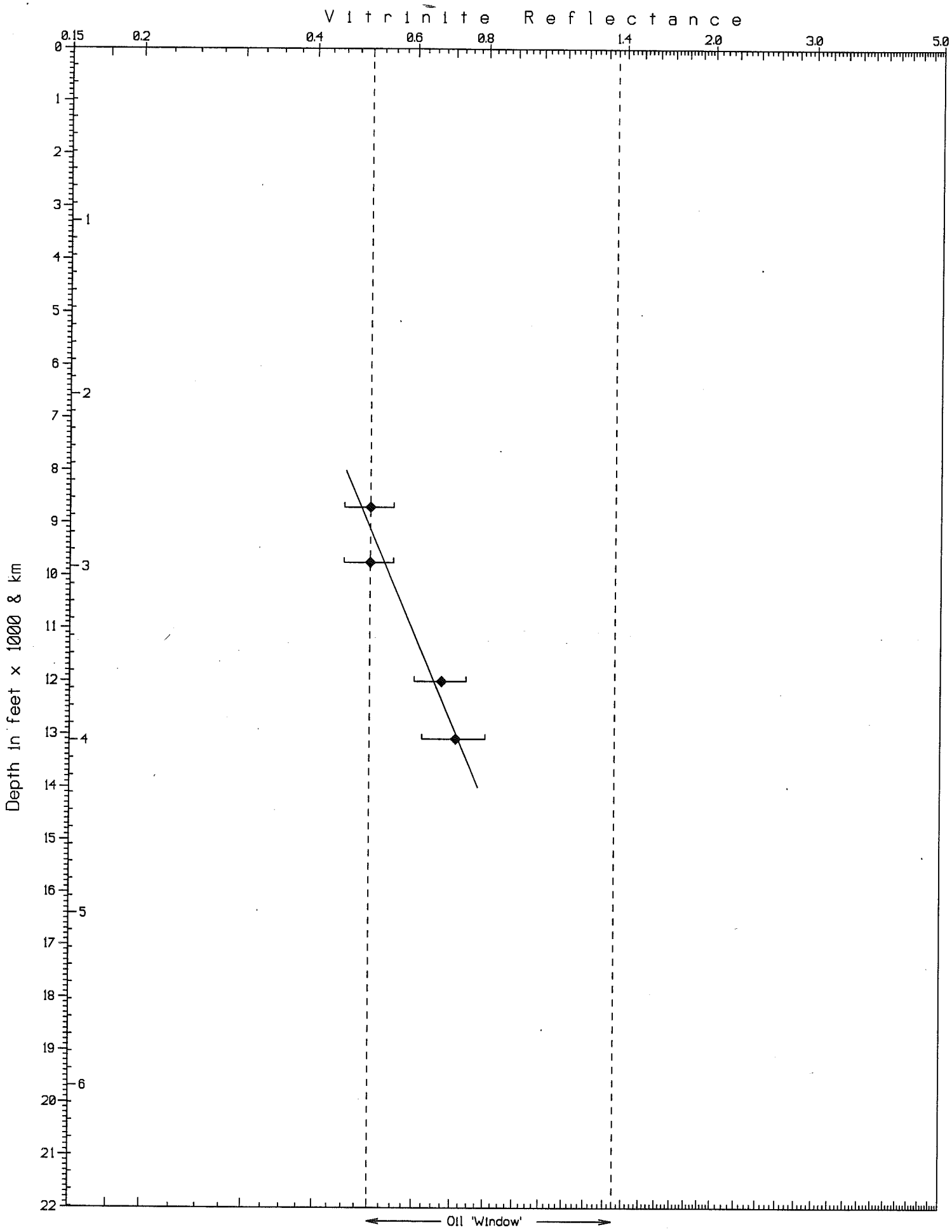


Fig. 7 Onondaga B-96

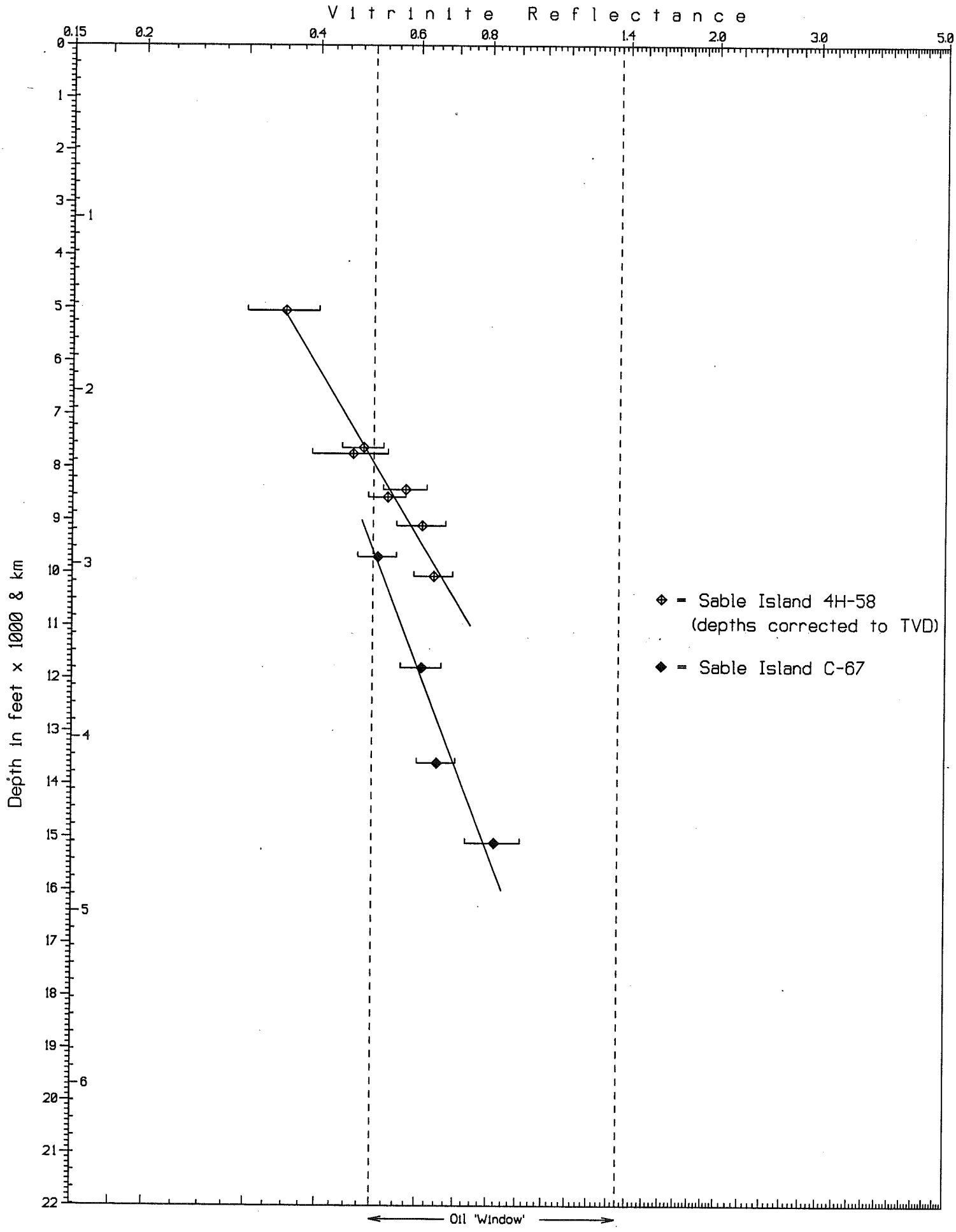


Fig. 8 Sable Island C-67

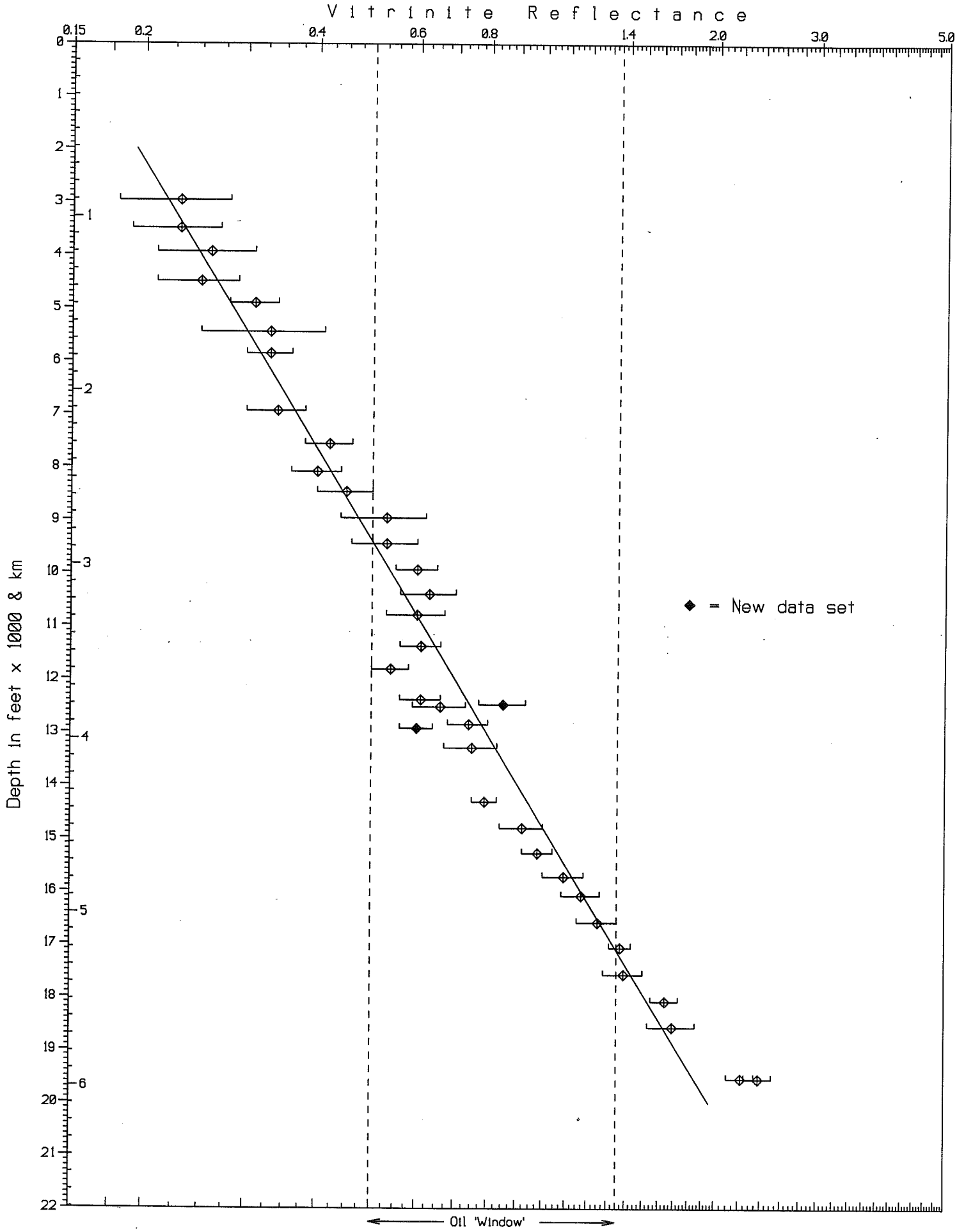


Fig. 9 South Desbarres O-76

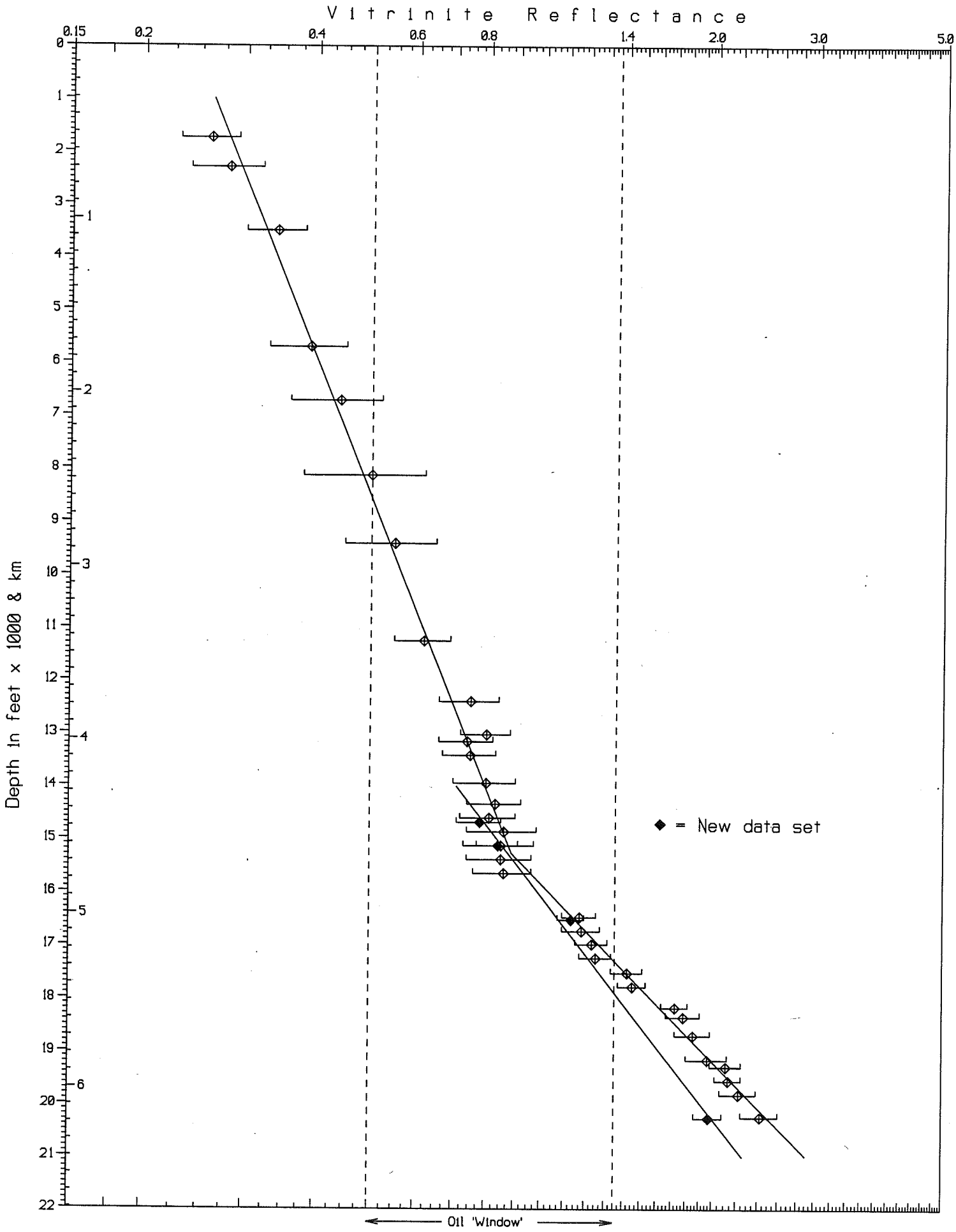


Fig. 10 South Venture O-59

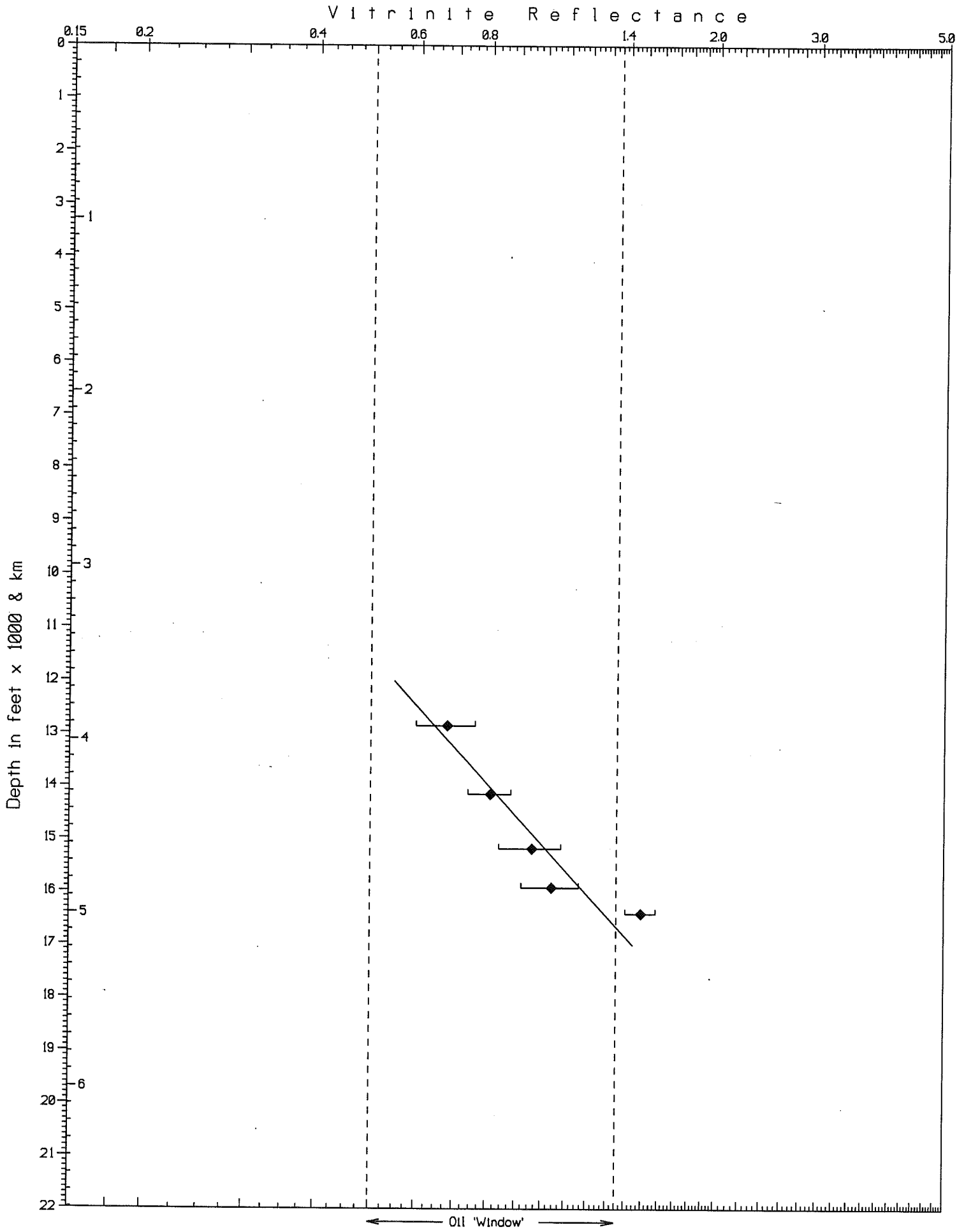


Fig. 11 Thebaud I-93

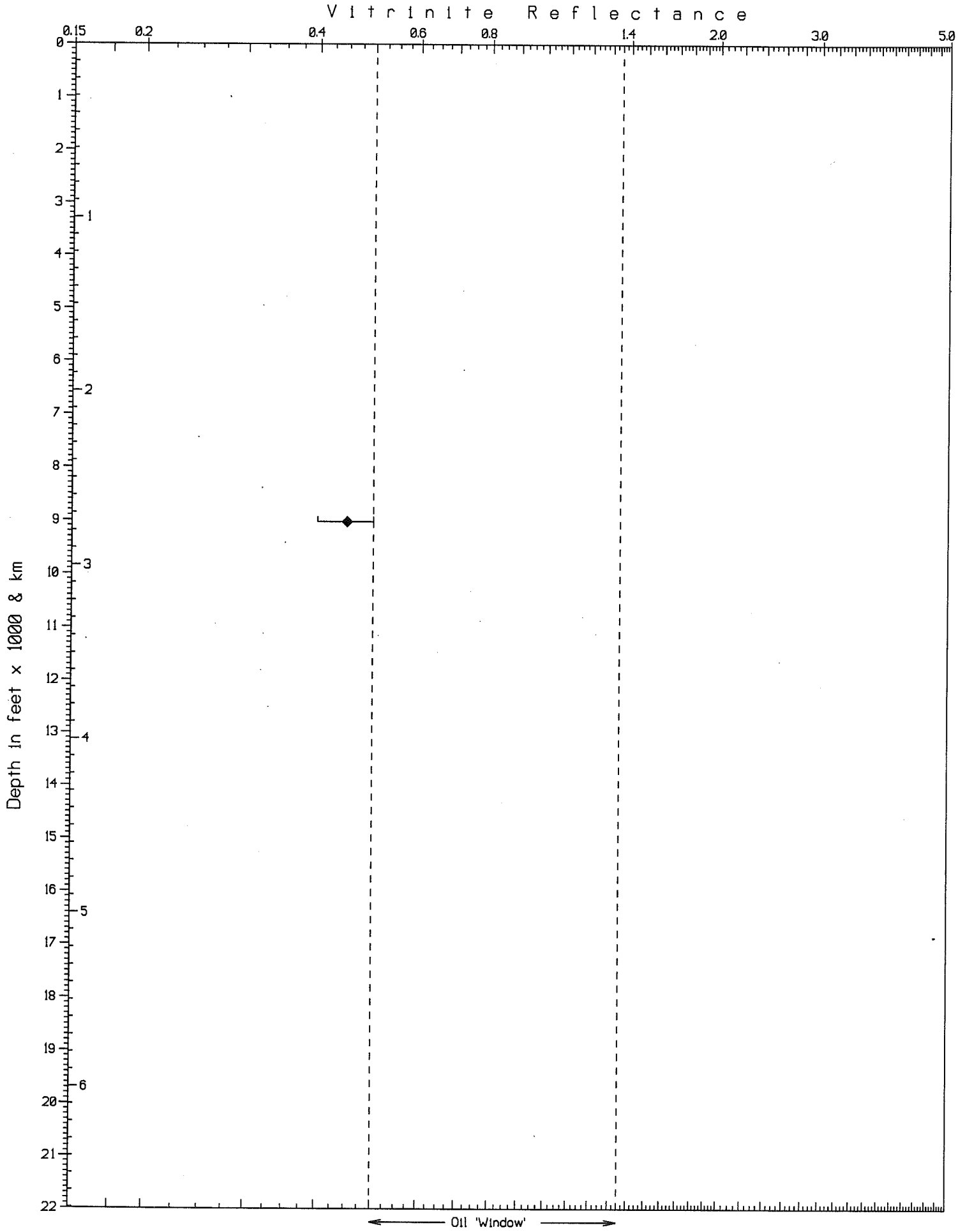


Fig. 12 Venture D-23

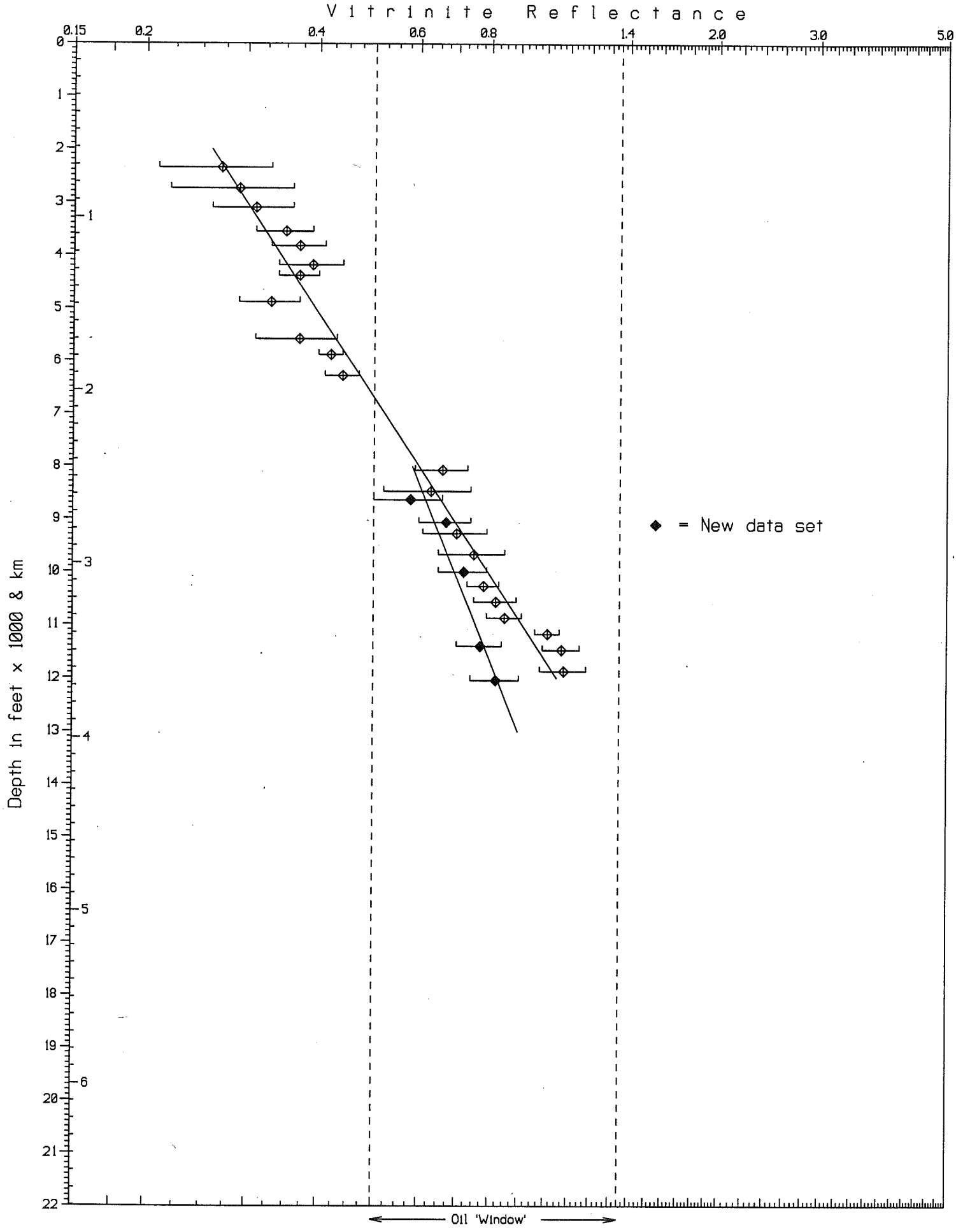


Fig. 13 Wenonah J-75

APPENDIX I

Kerogen Sample Preparation Method

CNSOPB Lab preparation

Preliminary wash
Dry samples in oven
Split: a. all of coarse to Petrology Lab
b. ½ medium to Palynology Lab
c. rest of medium and all of fine combined for Micropaleo Lab
Split "b" is delivered to Palynology Lab and treated as follows:

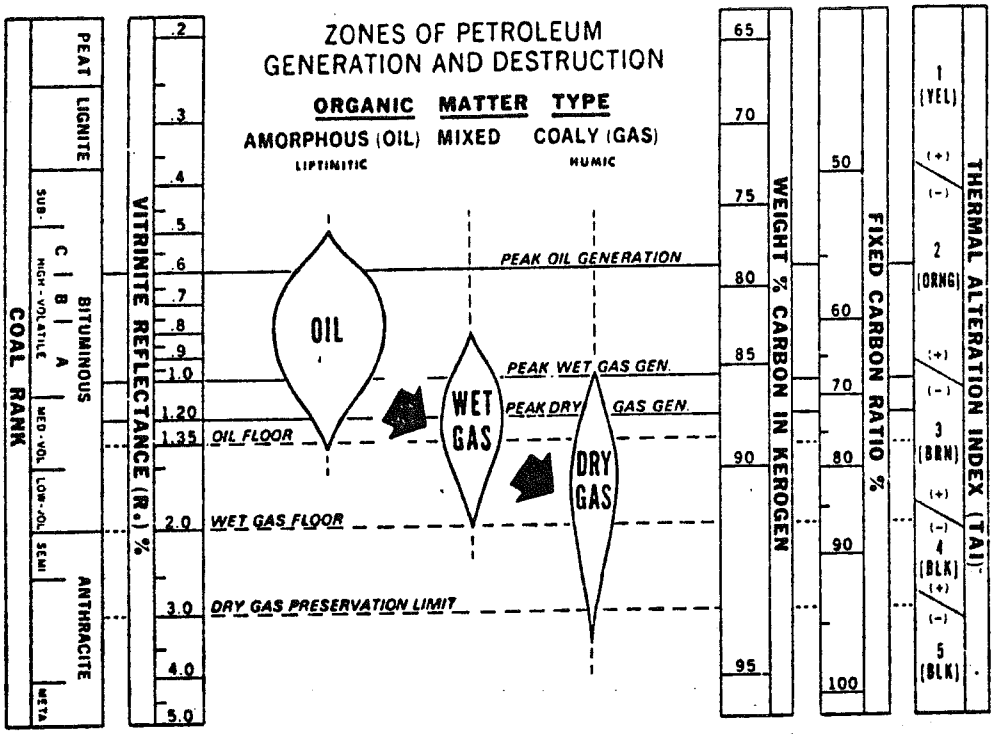
AGC PALYNOLOGY Lab preparation

Place 20-30 grams 250 ml plastic beaker.
Add 10% HC1 till reaction ceases (removes carbonates).
Wash (rinsed) 3 times.
Conc. HF overnight (removes silicates).
Wash (rinsed) 3 times.
Heat (60-65°C) conc. HCl (remove fluorides caused by HF).
Wash 3 times.
Transfer to 15 ml test tube with 4-5 ml 4% Alconox.
Differential centrifuge at 1500 rpm for 90 sec.
Decant.
Wash 3 times with centrifuging.
Float off organic fraction using 2.0 S.G. Znbr solution.
Centrifuge 1000 rpm, 8 min.
Float fraction into second test tube.
Wash 3 times with centrifuging.
Kerogen smear slide made.
Remaining kerogen material delivered to Vitrinite Reflectance Lab.

AGC VITRINITE REFLECTANCE Lab preparation

Pipette off excess water and place in plastic stubs (made to fit polisher).
Freeze dry and fix material for polishing with epoxy resin.
Polish with diamond based suspension to obtain low relief, scratch free surface.
Examine under oil lens, incident light at approximately 1000x 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

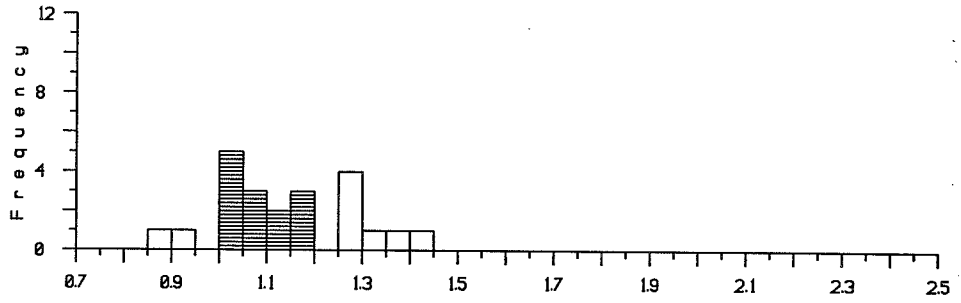
Reflectance Histograms

K0871A, 4730-4830M, BLUENOSE 2G-47

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.88	0.91	1.01<	1.02<	1.02<	1.05<	1.05<	1.08<	1.09<	1.09<
1	1.10<	1.13<	1.16<	1.18<	1.19<	1.25	1.26	1.30	1.30	1.34
2	1.40	1.44								

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.15	0.15	22	0.88	1.44	25.25
Edit<	1.09	0.06	13	1.01	1.19	14.17

Reflectance Histogram

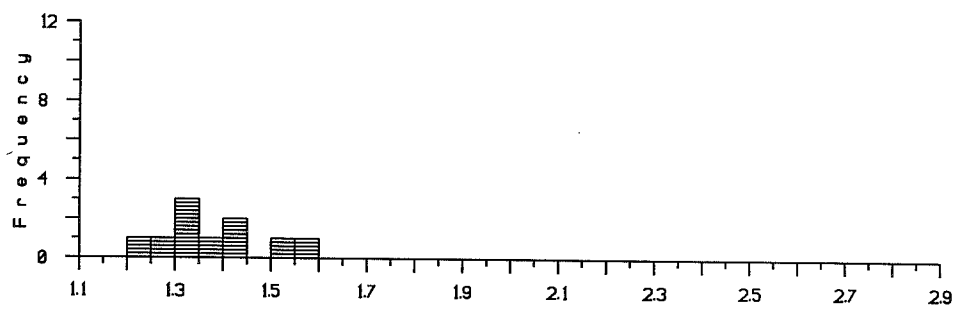


K0871C, 5260-5500M, BLUENOSE 2G-47

Col >	1	2	3	4	5	6	7	8	9	0
Row	1.23<	1.26<	1.31<	1.31<	1.34<	1.37<	1.43<	1.43<	1.53<	1.56<

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.38	0.11	10	1.23	1.56	13.77
Edit<	1.38	0.11	10	1.23	1.56	13.77

Reflectance Histogram

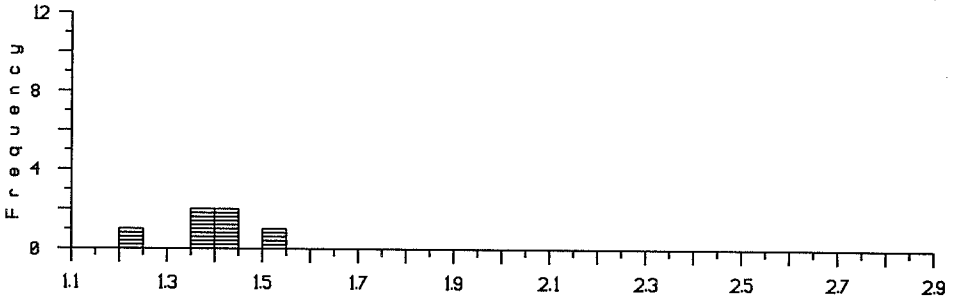


K0871B, 5050-5225M, BLUENOSE 2G-47

Col >	1	2	3	4	5	6	7	8	9	0
Row	1.21<	1.38<	1.39<	1.41<	1.41<	1.52<				

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.39	0.10	6	1.21	1.52	8.32
Edit<	1.39	0.10	6	1.21	1.52	8.32

Reflectance Histogram

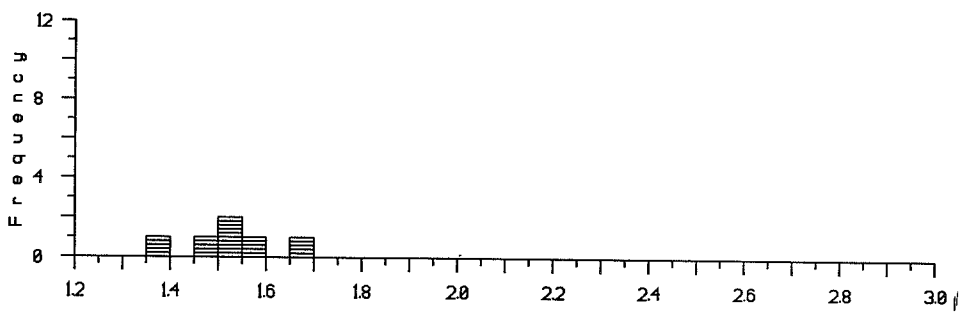


K0871D, 5695-5797M, BLUENOSE 2G-47

Col >	1	2	3	4	5	6	7	8	9	0
Row	1.35<	1.49<	1.51<	1.53<	1.57<	1.69<				

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.52	0.11	6	1.35	1.69	9.14
Edit<	1.52	0.11	6	1.35	1.69	9.14

Reflectance Histogram

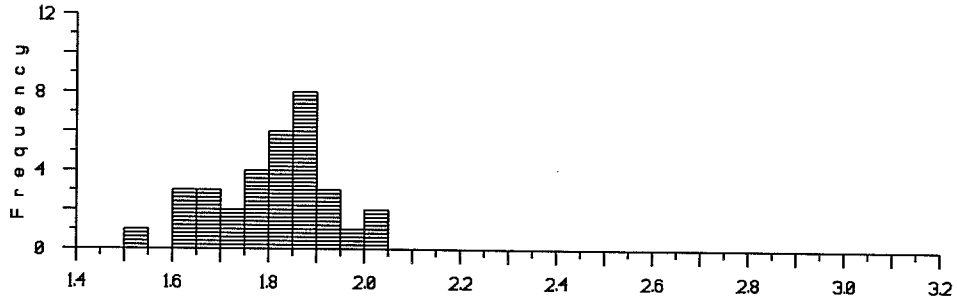


K0872A, 5500-5620M, Citadel H-52

Col >	1	2	3	4	5	6	7	8	9	0
Row	1.54<	1.62<	1.63<	1.65<	1.68<	1.68<	1.69<	1.70<	1.70<	1.76<
1	1.79<	1.79<	1.80<	1.81<	1.81<	1.82<	1.83<	1.83<	1.84<	1.86<
2	1.86<	1.86<	1.87<	1.88<	1.88<	1.89<	1.90<	1.91<	1.91<	1.94<
3	1.96<	2.00<	2.04<							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.81	0.12	33	1.54	2.04	59.73
Edit<	1.81	0.12	33	1.54	2.04	59.73

Reflectance Histogram

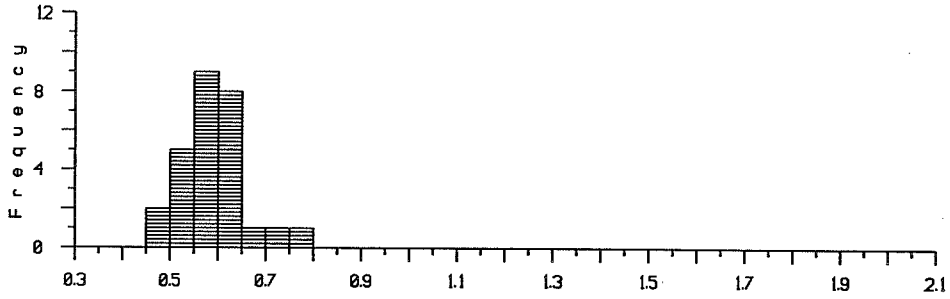


K0864A, 10800-11670', EAGLE D-21

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.48<	0.49<	0.51<	0.52<	0.52<	0.54<	0.54<	0.55<	0.56<	0.56<
1	0.56<	0.56<	0.57<	0.57<	0.58<	0.59<	0.60<	0.60<	0.61<	0.61<
2	0.62<	0.63<	0.63<	0.64<	0.66<	0.72<	0.75<			

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.58	0.06	27	0.48	0.75	15.77
Edit<	0.58	0.06	27	0.48	0.75	15.77

Reflectance Histogram

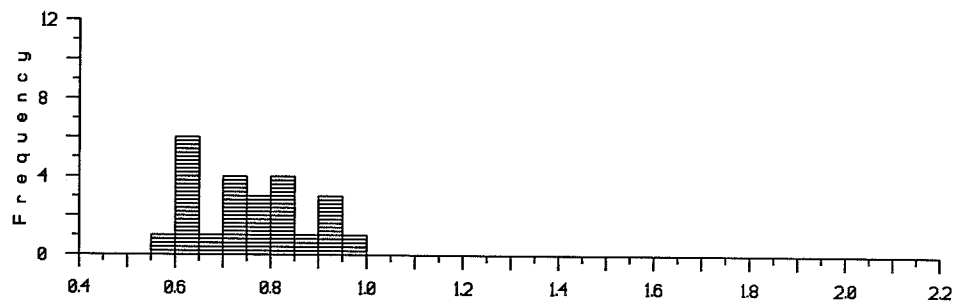


K0864C, 13400-14400', EAGLE D-21

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.57<	0.60<	0.61<	0.64<	0.64<	0.65<	0.65<	0.67<	0.71<	0.73<
1	0.73<	0.74<	0.77<	0.78<	0.78<	0.82<	0.84<	0.84<	0.84<	0.86<
2	0.91<	0.92<	0.92<	0.96<						

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.76	0.11	24	0.57	0.96	18.18
Edit<	0.76	0.11	24	0.57	0.96	18.18

Reflectance Histogram

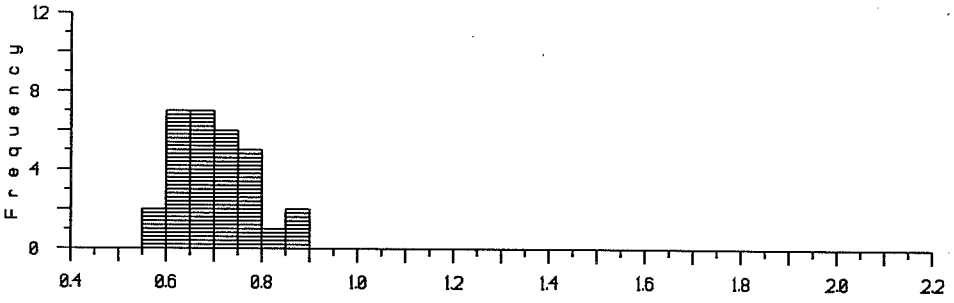


K0864B, 11800-12600', EAGLE D-21

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.57<	0.59<	0.60<	0.62<	0.62<	0.62<	0.63<	0.63<	0.63<	0.66<
1	0.67<	0.68<	0.68<	0.69<	0.70<	0.70<	0.71<	0.71<	0.72<	0.73<
2	0.74<	0.74<	0.76<	0.76<	0.78<	0.78<	0.78<	0.83<	0.85<	0.85<
3										

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.70	0.08	30	0.57	0.85	21.03
Edit<	0.70	0.08	30	0.57	0.85	21.03

Reflectance Histogram

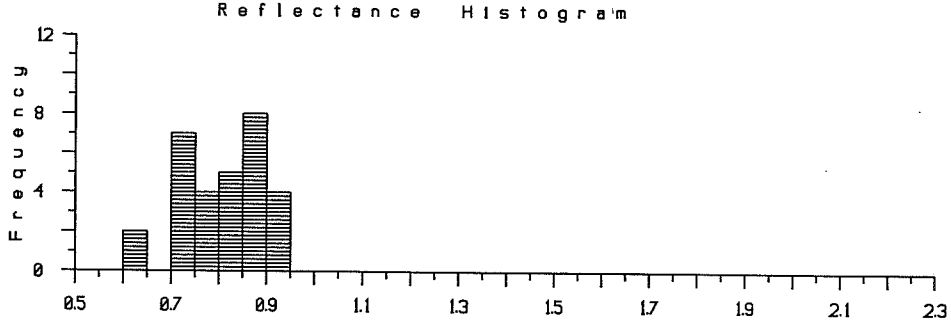


K0864D, 14550-15290', EAGLE D-21

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.62<	0.65<	0.71<	0.72<	0.73<	0.73<	0.73<	0.74<	0.74<	0.77<
1	0.78<	0.78<	0.79<	0.80<	0.81<	0.82<	0.82<	0.83<	0.85<	0.86<
2	0.87<	0.88<	0.88<	0.88<	0.89<	0.90<	0.91<	0.92<	0.92<	0.95<
3										

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.81	0.08	30	0.62	0.95	24.28
Edit<	0.81	0.08	30	0.62	0.95	24.28

Reflectance Histogram

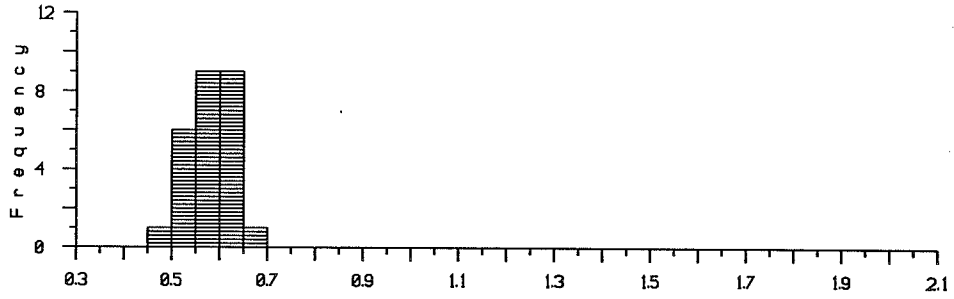


K0865A, 9280-9680', INTREPID L-80

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.47<	0.50<	0.52<	0.52<	0.53<	0.54<	0.54<	0.55<	0.56<	0.56<
1	0.56<	0.56<	0.57<	0.57<	0.59<	0.59<	0.60<	0.60<	0.61<	0.61<
2	0.61<	0.63<	0.64<	0.65<	0.65<	0.69<				

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.58	0.05	26	0.47	0.69	15.02
Edit<	0.58	0.05	26	0.47	0.69	15.02

Reflectance Histogram

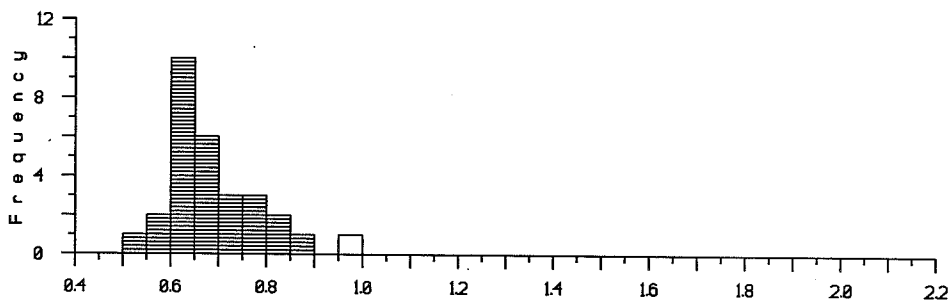


K0865C, 11575-12400', INTREPID L-80

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.52<	0.55<	0.57<	0.60<	0.60<	0.61<	0.61<	0.62<	0.62<	0.63<
1	0.63<	0.64<	0.64<	0.66<	0.67<	0.68<	0.70<	0.70<	0.70<	0.71<
2	0.72<	0.73<	0.77<	0.78<	0.78<	0.80<	0.80<	0.89<	0.99	

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.69	0.10	29	0.52	0.99	19.92
Edit<	0.68	0.09	28	0.52	0.89	18.93

Reflectance Histogram

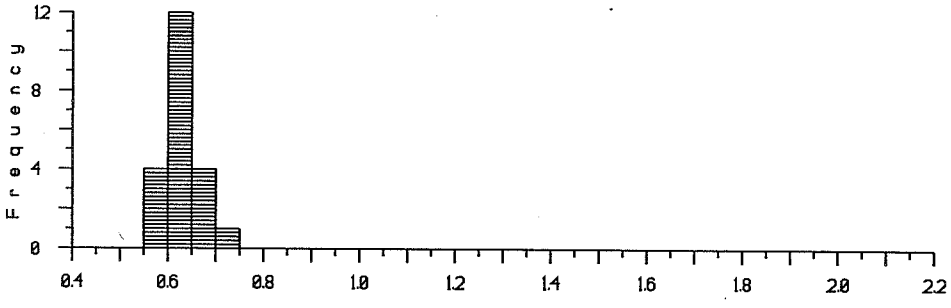


K0865B, 10750-11250', INTREPID L-80

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.55<	0.58<	0.58<	0.59<	0.60<	0.60<	0.61<	0.61<	0.62<	0.63<
1	0.63<	0.64<	0.64<	0.64<	0.65<	0.65<	0.66<	0.68<	0.69<	0.70<
2	0.73<									

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.63	0.04	21	0.55	0.73	13.28
Edit<	0.63	0.04	21	0.55	0.73	13.28

Reflectance Histogram

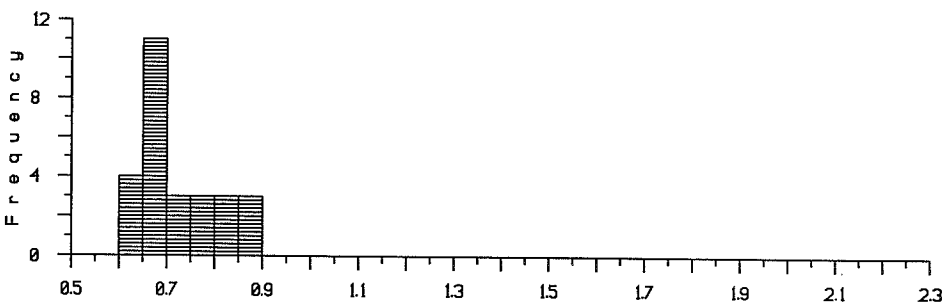


K0865D, 12400-12940', INTREPID L-80

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.60<	0.63<	0.64<	0.65<	0.66<	0.66<	0.66<	0.67<	0.67<	0.67<
1	0.67<	0.68<	0.68<	0.69<	0.70<	0.71<	0.72<	0.72<	0.77<	0.78<
2	0.79<	0.80<	0.83<	0.83<	0.85<	0.86<	0.89<			

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.72	0.08	27	0.60	0.89	19.48
Edit<	0.72	0.08	27	0.60	0.89	19.48

Reflectance Histogram

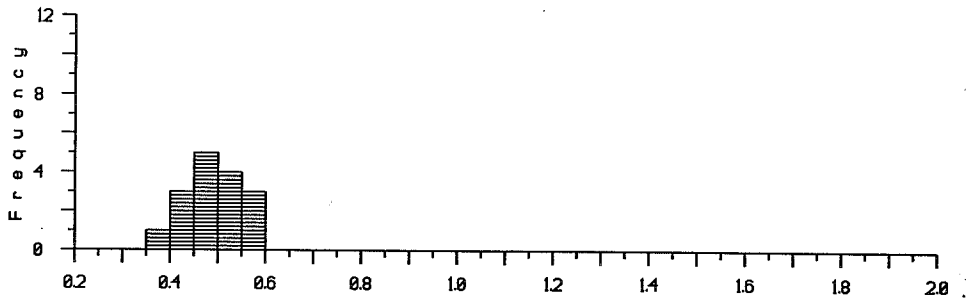


K0875A, 2515-2690M, Merigomish C-52

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.38<	0.40<	0.43<	0.45<	0.46<	0.46<	0.47<	0.47<	0.49<	0.50<
1	0.50<	0.50<	0.51<	0.55<	0.56<	0.58<				

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.48	0.05	16	0.38	0.58	7.71
Edit<	0.48	0.05	16	0.38	0.58	7.71

Reflectance Histogram

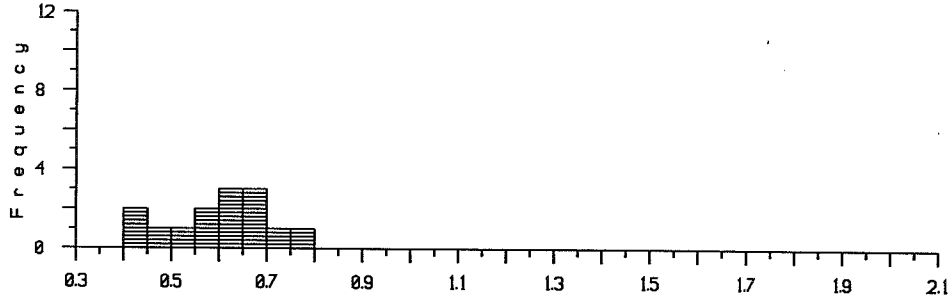


K0875B, 2750-2895M, Merigomish C-52

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.44<	0.45<	0.48<	0.51<	0.57<	0.58<	0.61<	0.63<	0.64<	0.66<
1	0.67<	0.70<	0.74<	0.78<						

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.60	0.11	14	0.44	0.78	8.46
Edit<	0.60	0.11	14	0.44	0.78	8.46

Reflectance Histogram

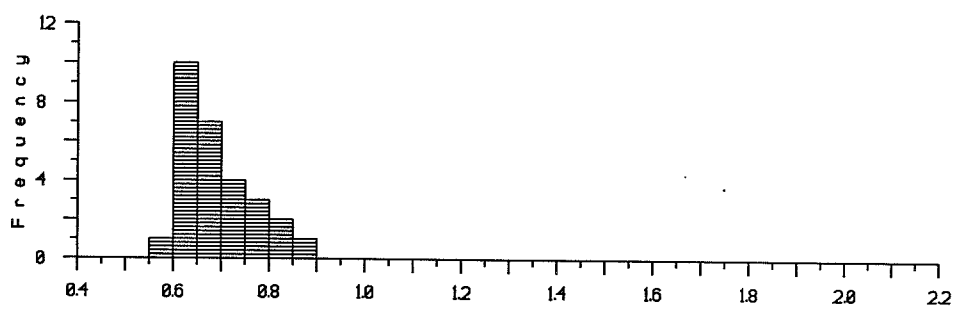


K0875C, 3000-3200M, Merigomish C-52

Col >	1	2	3	4	5	6.	7	8	9	0
Row	0.59<	0.60<	0.60<	0.61<	0.63<	0.63<	0.63<	0.65<	0.65<	0.65<
1	0.65<	0.66<	0.66<	0.66<	0.67<	0.67<	0.68<	0.70<	0.71<	0.72<
2	0.73<	0.74<	0.75<	0.75<	0.75<	0.82<	0.82<	0.88<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.69	0.07	28	0.59	0.88	19.26
Edit<	0.69	0.07	28	0.59	0.88	19.26

Reflectance Histogram

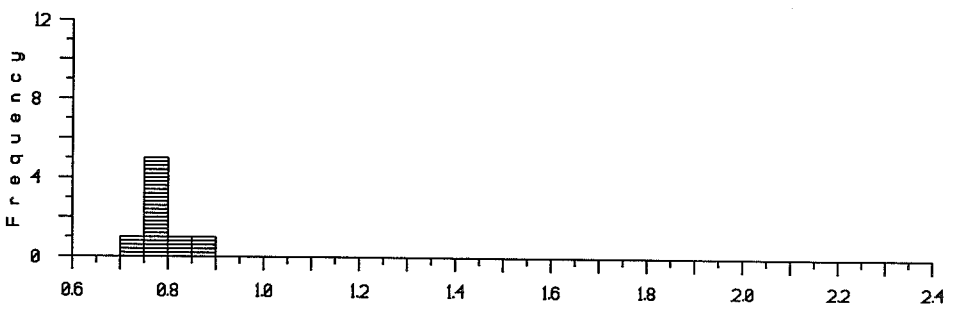


K0875D, 3250-3500M, Merigomish C-52

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.72<	0.76<	0.76<	0.77<	0.79<	0.79<	0.83<	0.86<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.79	0.04	8	0.72	0.86	6.28
Edit<	0.79	0.04	8	0.72	0.86	6.28

Reflectance Histogram

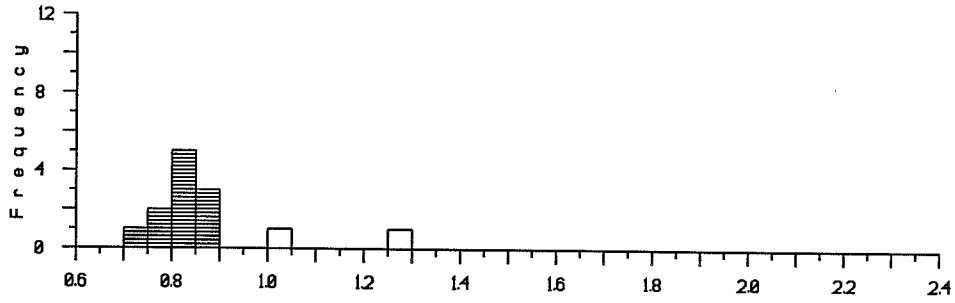


K0876A, 3525-3700M, Merigomish C-52

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.73<	0.77<	0.78<	0.80<	0.83<	0.83<	0.84<	0.84<	0.85<	0.86<
1	0.87<	1.05	1.27							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.87	0.14	13	0.73	1.27	11.32
Edit<	0.82	0.04	11	0.73	0.87	9.00

Reflectance Histogram

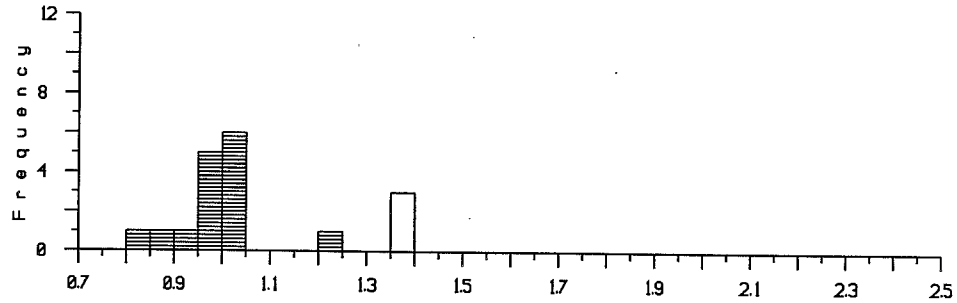


K0876B, 3730-3950M, Merigomish C-52

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.83<	0.89<	0.95<	0.96<	0.96<	0.97<	0.98<	0.99<	1.00<	1.00<
1	1.00<	1.02<	1.04<	1.05<	1.21<	1.36	1.39	1.39		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.05	0.17	18	0.83	1.39	18.99
Edit<	0.99	0.08	15	0.83	1.21	14.85

Reflectance Histogram

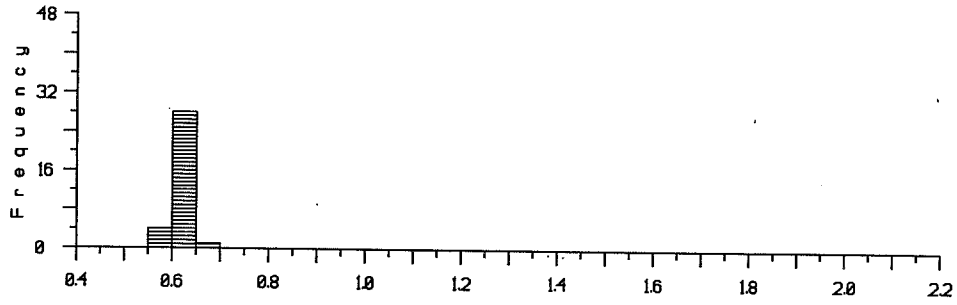


PH1960, 3773.5M, North Triumph B-52

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.57<	0.57<	0.57<	0.59<	0.60<	0.61<	0.62<	0.62<	0.62<	0.62<
1	0.63<	0.63<	0.63<	0.63<	0.63<	0.63<	0.63<	0.63<	0.64<	0.64<
2	0.64<	0.64<	0.64<	0.64<	0.64<	0.64<	0.64<	0.65<	0.65<	0.65<
3	0.65<	0.65<	0.66<							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.63	0.02	33	0.57	0.66	20.70
Edit<	0.63	0.02	33	0.57	0.66	20.70

Reflectance Histogram

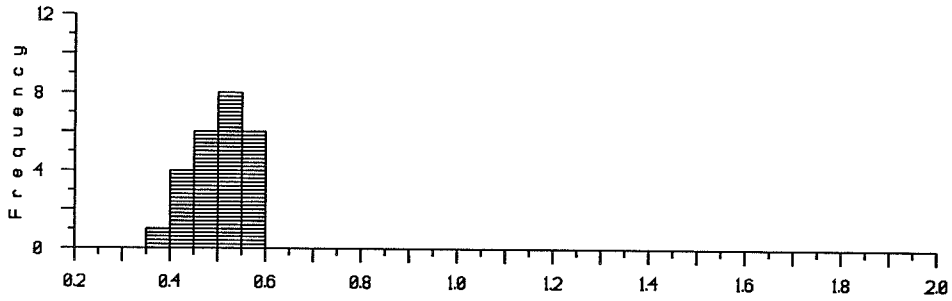


K0866A, 8100-8700', Onondaga B-96

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.37<	0.41<	0.43<	0.44<	0.44<	0.47<	0.47<	0.47<	0.48<	0.49<
1	0.49<	0.50<	0.51<	0.51<	0.51<	0.52<	0.52<	0.53<	0.53<	0.55<
2	0.55<	0.55<	0.56<	0.57<	0.57<					

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.50	0.05	25	0.37	0.57	12.44
Edit<	0.50	0.05	25	0.37	0.57	12.44

Reflectance Histogram

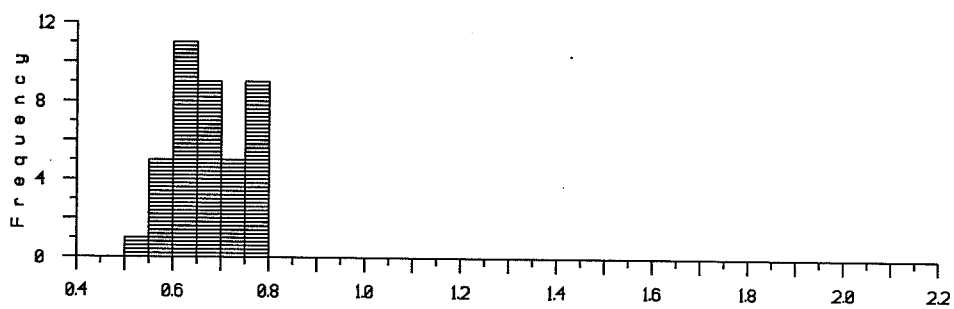


K0866C, 11890-12000', Onondaga B-96

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.60<	0.55<	0.55<	0.56<	0.57<	0.58<	0.60<	0.60<	0.61<	0.62<
1	0.62<	0.63<	0.64<	0.64<	0.65<	0.65<	0.65<	0.66<	0.66<	0.67<
2	0.67<	0.68<	0.68<	0.69<	0.69<	0.70<	0.71<	0.71<	0.72<	0.72<
3	0.72<	0.75<	0.75<	0.76<	0.77<	0.77<	0.77<	0.77<	0.78<	0.79<

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.67	0.07	40	0.50	0.79	26.81
Edit<	0.67	0.07	40	0.50	0.79	26.81

Reflectance Histogram

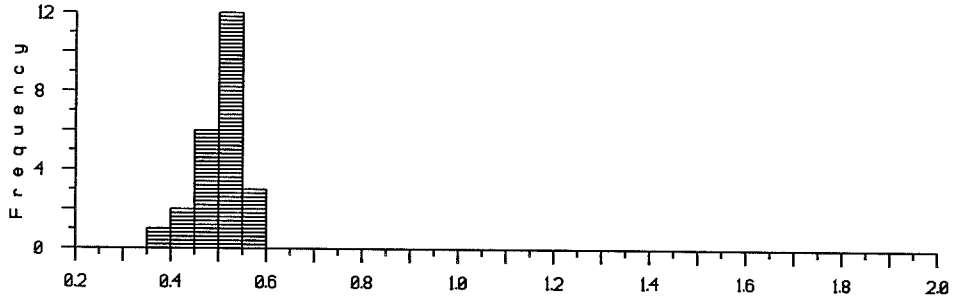


K0866B, 9200-9750', Onondaga B-96

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.37<	0.41<	0.41<	0.47<	0.48<	0.48<	0.49<	0.49<	0.49<	0.50<
1	0.50<	0.51<	0.51<	0.52<	0.52<	0.52<	0.53<	0.53<	0.53<	0.53<
2	0.54<	0.57<	0.58<	0.59<						

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.50	0.05	24	0.37	0.59	12.07
Edit<	0.50	0.05	24	0.37	0.59	12.07

Reflectance Histogram

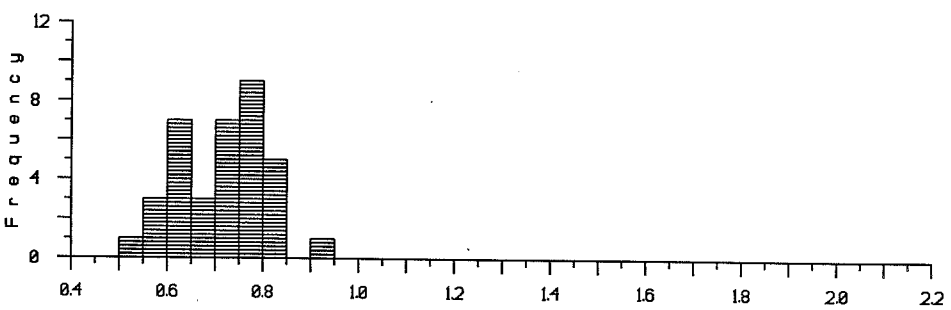


K0866D, 12000-13085', Onondaga B-96

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.52<	0.55<	0.56<	0.57<	0.61<	0.61<	0.62<	0.63<	0.64<	0.64<
1	0.65<	0.66<	0.69<	0.70<	0.71<	0.71<	0.72<	0.73<	0.73<	0.74<
2	0.74<	0.75<	0.75<	0.76<	0.76<	0.76<	0.77<	0.77<	0.78<	0.79<
3	0.81<	0.83<	0.83<	0.83<	0.83<	0.92<				

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.71	0.09	36	0.52	0.92	25.67
Edit<	0.71	0.09	36	0.52	0.92	25.67

Reflectance Histogram

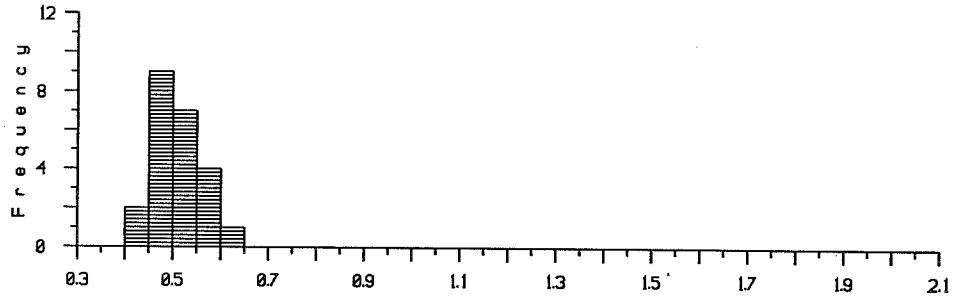


K0863A, 9090-9700', SABLE ISLAND C-67

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.43<	0.43<	0.46<	0.46<	0.47<	0.48<	0.48<	0.48<	0.49<	0.49<
1	0.49<	0.50<	0.50<	0.50<	0.53<	0.53<	0.53<	0.54<	0.55<	0.55<
2	0.56<	0.57<	0.60<							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.51	0.04	23	0.43	0.60	11.62
Edit<	0.51	0.04	23	0.43	0.60	11.62

Reflectance Histogram

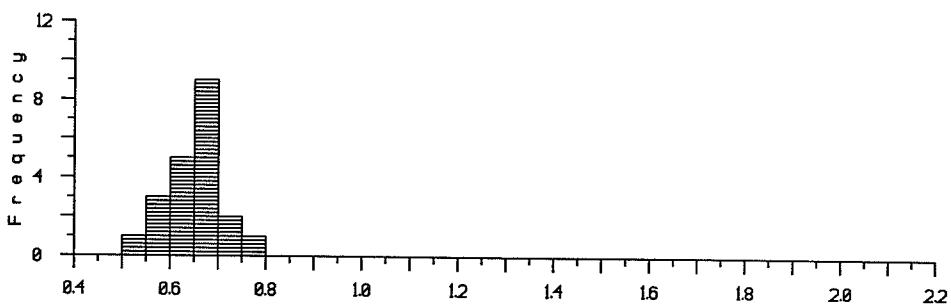


K0863C, 13100-13600', SABLE ISLAND C-67

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.54<	0.57<	0.58<	0.59<	0.60<	0.63<	0.63<	0.63<	0.65<	0.66<
1	0.66<	0.67<	0.67<	0.68<	0.68<	0.68<	0.69<	0.69<	0.71<	0.72<
2	0.75<									

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.65	0.05	21	0.54	0.75	13.68
Edit<	0.65	0.05	21	0.54	0.75	13.68

Reflectance Histogram

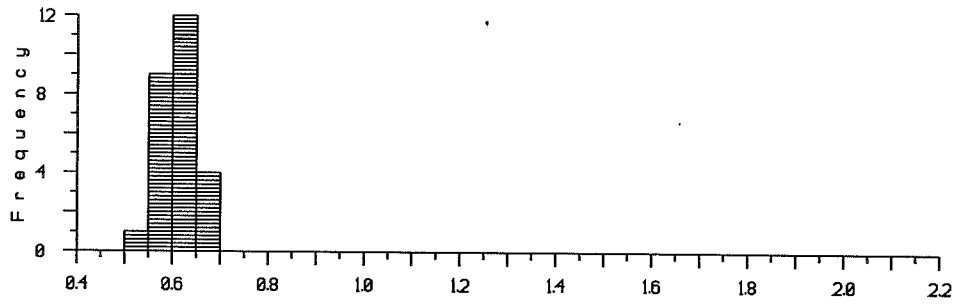


K0863B, 11050-11800', SABLE ISLAND C-67

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

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.61	0.05	26	0.53	0.70	15.84
Edit<	0.61	0.05	26	0.53	0.70	15.84

Reflectance Histogram

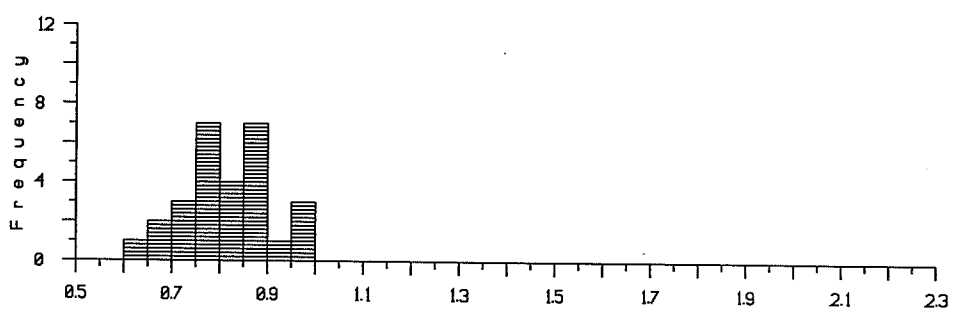


K0863D, 14000-15106', SABLE ISLAND C-67

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.65<	0.66<	0.66<	0.72<	0.73<	0.74<	0.76<	0.77<	0.77<	0.78<
1	0.79<	0.79<	0.79<	0.81<	0.82<	0.84<	0.84<	0.85<	0.87<	0.87<
2	0.87<	0.87<	0.88<	0.89<	0.94<	0.96<	0.98<	0.99<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.82	0.09	28	0.65	0.99	22.89
Edit<	0.82	0.09	28	0.65	0.99	22.89

Reflectance Histogram

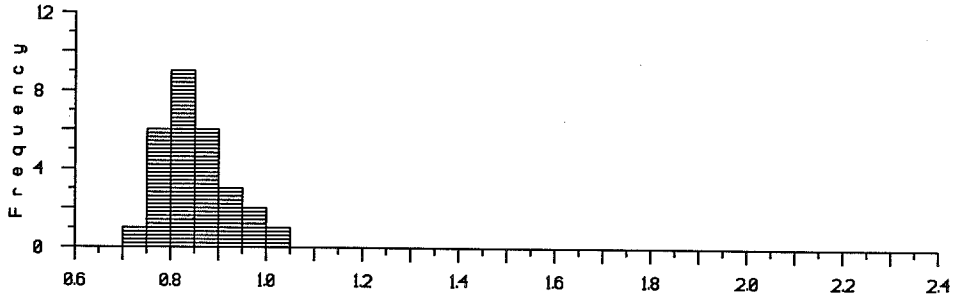


PH1961, 3801.8-3801.9M, SOUTH DESBARRES 0-76

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.74<	0.76<	0.77<	0.77<	0.78<	0.78<	0.78<	0.80<	0.81<	0.81<
1	0.82<	0.82<	0.82<	0.83<	0.83<	0.84<	0.85<	0.85<	0.85<	0.86<
2	0.90<	0.90<	0.94<	0.94<	0.94<	0.98<	0.99<	1.03<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.85	0.08	28	0.74	1.03	23.79
Edit<	0.85	0.08	28	0.74	1.03	23.79

Reflectance Histogram

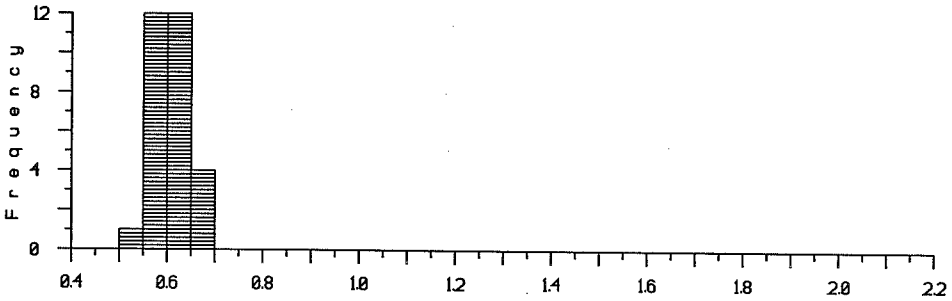


PH1959, 3938.31M, SOUTH DESBARRES 0-76

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

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.60	0.04	29	0.53	0.67	17.44
Edit<	0.60	0.04	29	0.53	0.67	17.44

Reflectance Histogram

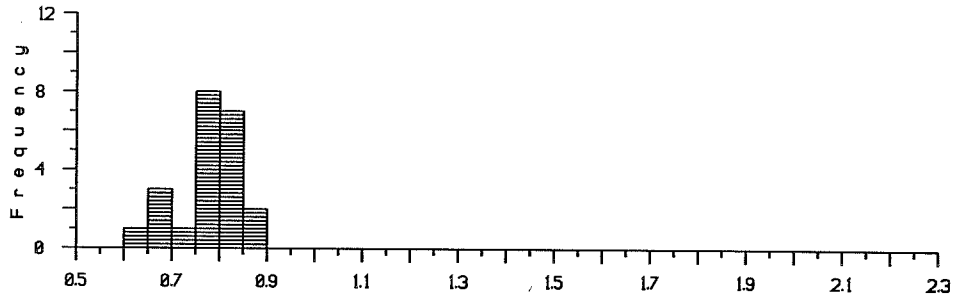


K0870A, 4340-4475M, SOUTH VENTURE 0-59

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.64<	0.66<	0.70<	0.70<	0.74<	0.75<	0.76<	0.76<	0.76<	0.77<
1	0.78<	0.78<	0.79<	0.80<	0.81<	0.82<	0.83<	0.83<	0.83<	0.84<
2	0.88<	0.90<								

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.78	0.07	22	0.64	0.90	17.13
Edit<	0.78	0.07	22	0.64	0.90	17.13

Reflectance Histogram

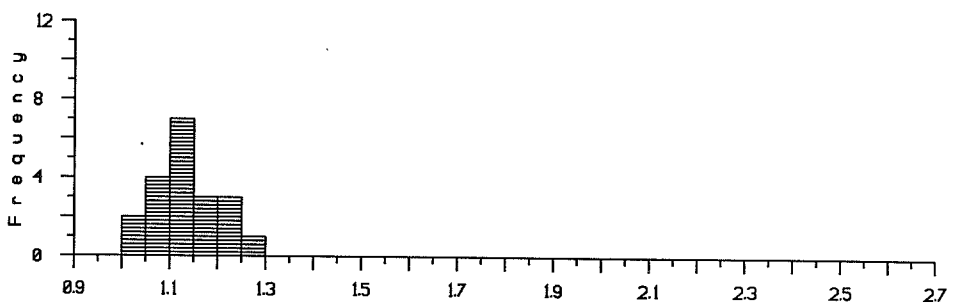


K0870C, 4895-5035M, SOUTH VENTURE 0-59

Col >	1	2	3	4	5	6	7	8	9	0
Row	1.03<	1.05<	1.06<	1.06<	1.08<	1.09<	1.10<	1.11<	1.12<	1.13<
1	1.13<	1.13<	1.15<	1.17<	1.17<	1.18<	1.20<	1.21<	1.23<	1.26<

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.13	0.06	20	1.03	1.26	22.66
Edit<	1.13	0.06	20	1.03	1.26	22.66

Reflectance Histogram

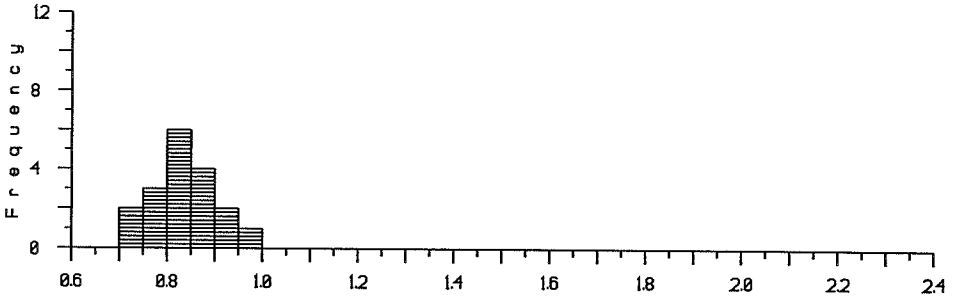


K0870B, 4475-4610M, SOUTH VENTURE 0-59

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.73<	0.74<	0.77<	0.78<	0.78<	0.80<	0.80<	0.82<	0.82<	0.83<
1	0.84<	0.86<	0.87<	0.90<	0.90<	0.92<	0.93<	0.96<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.84	0.07	18	0.73	0.96	15.05
Edit<	0.84	0.07	18	0.73	0.96	15.05

Reflectance Histogram

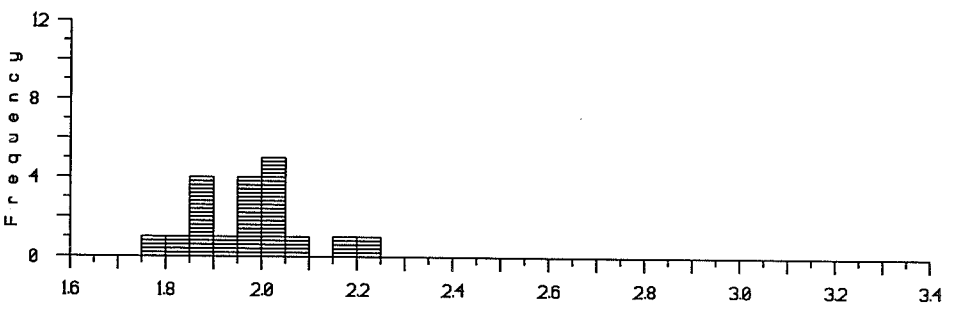


K0870D, 5865-6176M, SOUTH VENTURE 0-59

Col >	1	2	3	4	5	6	7	8	9	0
Row	1.78<	1.82<	1.85<	1.87<	1.89<	1.89<	1.93<	1.95<	1.97<	1.97<
1	1.97<	2.00<	2.00<	2.00<	2.02<	2.02<	2.06<	2.16<	2.23<	

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.97	0.11	19	1.78	2.23	37.38
Edit<	1.97	0.11	19	1.78	2.23	37.38

Reflectance Histogram

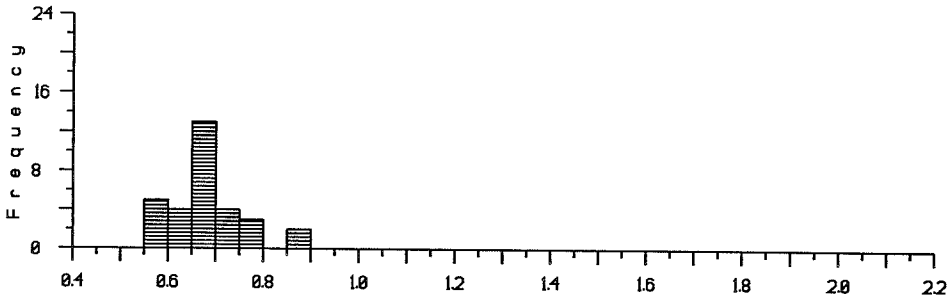


K0873A, 3835-3915M, Thebaud I-93

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.55<	0.56<	0.57<	0.58<	0.59<	0.62<	0.62<	0.63<	0.64<	0.66<
1	0.67<	0.67<	0.67<	0.67<	0.68<	0.68<	0.68<	0.69<	0.70<	0.70<
2	0.70<	0.70<	0.71<	0.73<	0.74<	0.74<	0.76<	0.77<	0.78<	0.85<
3	0.86<									

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.68	0.08	31	0.55	0.86	21.17
Edit<	0.68	0.08	31	0.55	0.86	21.17

Reflectance Histogram

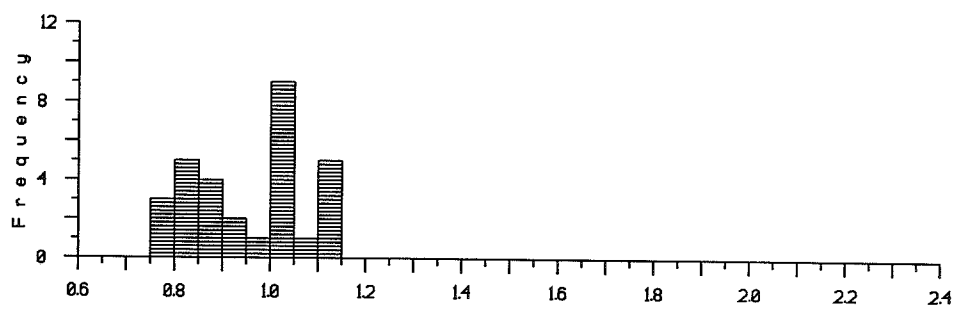


K0873C, 4410-4625M, Thebaud I-93

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.77<	0.78<	0.78<	0.80<	0.82<	0.82<	0.83<	0.84<	0.86<	0.87<
1	0.88<	0.88<	0.94<	0.95<	0.99<	1.00<	1.00<	1.01<	1.02<	1.02<
2	1.03<	1.04<	1.04<	1.05<	1.08<	1.11<	1.12<	1.12<	1.13<	1.15<

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.96	0.12	30	0.77	1.15	28.73
Edit<	0.96	0.12	30	0.77	1.15	28.73

Reflectance Histogram

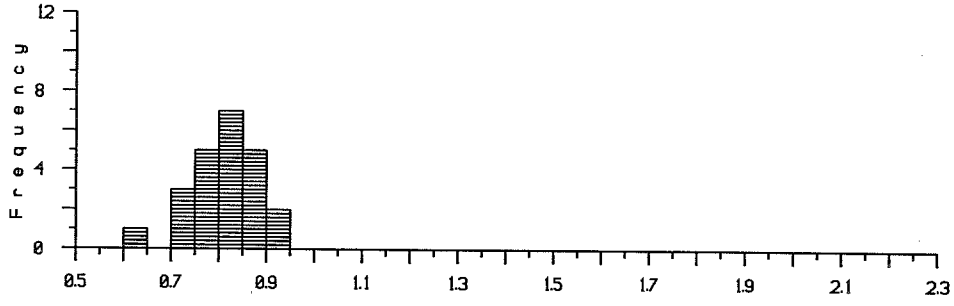


K0873B, 4115-4310M, Thebaud I-93

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.64<	0.71<	0.72<	0.73<	0.76<	0.76<	0.76<	0.77<	0.79<	0.80<
1	0.81<	0.81<	0.82<	0.82<	0.84<	0.84<	0.87<	0.88<	0.89<	0.89<
2	0.90<	0.91<	0.92<							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.81	0.07	23	0.64	0.92	18.64
Edit<	0.81	0.07	23	0.64	0.92	18.64

Reflectance Histogram

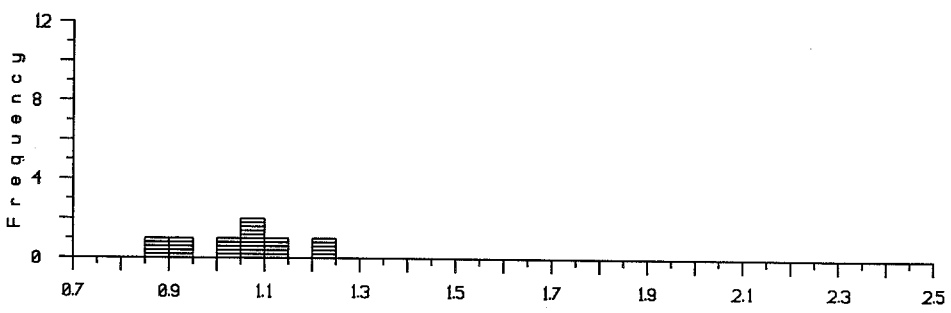


K0873D, 4665-4850M, Thebaud I-93

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.87<	0.92<	1.05<	1.06<	1.08<	1.12<	1.21<			

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.04	0.12	7	0.87	1.21	7.31
Edit<	1.04	0.12	7	0.87	1.21	7.31

Reflectance Histogram

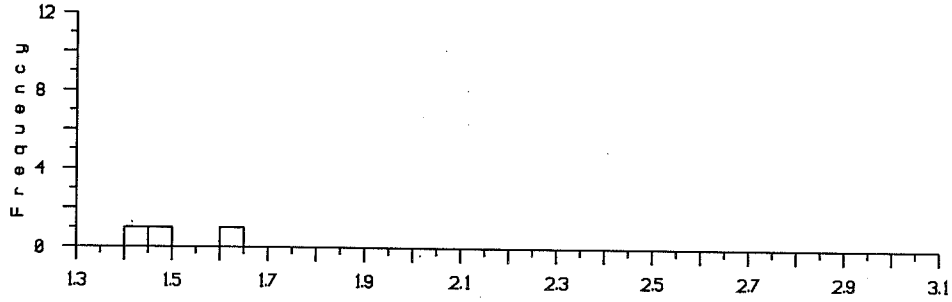


K0874A, 4860-5000M, Thebaud I-93

Col >	1	2	3	4	5	6	7	8	9	0
Row	1.43<	1.45<	1.60<							

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	1.49	0.09	3	1.43	1.60	4.48

Reflectance Histogram

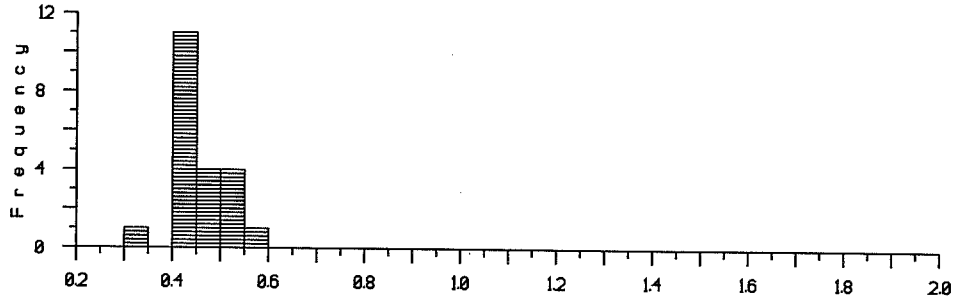


K0869A, 2700-2750M, Venture D-23

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.35<	0.40<	0.41<	0.41<	0.42<	0.42<	0.42<	0.43<	0.45<	0.45<
1	0.45<	0.45<	0.47<	0.47<	0.47<	0.47<	0.50<	0.50<	0.52<	0.53<
2	0.56<									

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.45	0.05	21	0.35	0.56	9.55
Edit<	0.45	0.05	21	0.35	0.56	9.55

Reflectance Histogram

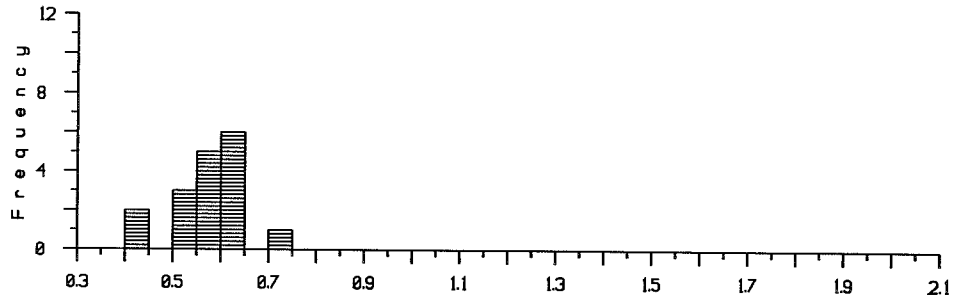


K0867A, 8230-8630', WENONAH J-75

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.42<	0.45<	0.52<	0.54<	0.54<	0.55<	0.55<	0.57<	0.58<	0.59<
1	0.60<	0.62<	0.63<	0.63<	0.64<	0.65<	0.74<			

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.58	0.08	17	0.42	0.74	9.82
Edit<	0.58	0.08	17	0.42	0.74	9.82

Reflectance Histogram

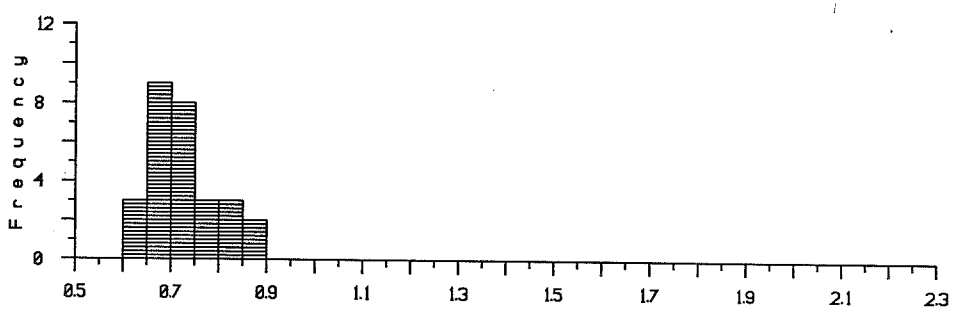


K0867C, 9200-10000', WENONAH J-75

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.60<	0.61<	0.63<	0.66<	0.66<	0.66<	0.67<	0.69<	0.70<	0.70<
1	0.70<	0.70<	0.71<	0.72<	0.72<	0.73<	0.73<	0.73<	0.74<	0.74<
2	0.75<	0.75<	0.78<	0.80<	0.80<	0.81<	0.86<	0.90<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.72	0.07	28	0.60	0.90	20.25
Edit<	0.72	0.07	28	0.60	0.90	20.25

Reflectance Histogram

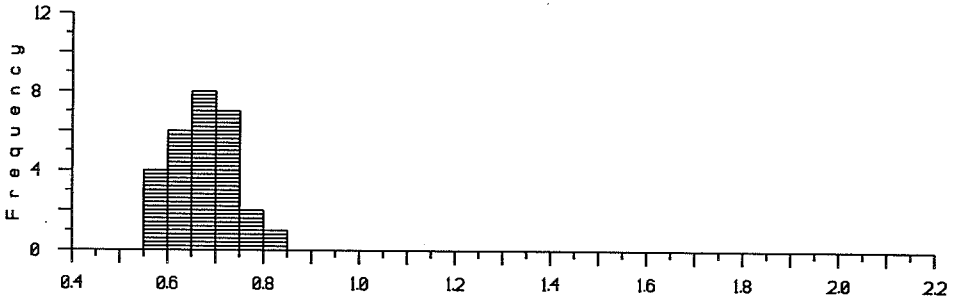


K0867B, 8630-9060', WENONAH J-75

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.55<	0.56<	0.57<	0.57<	0.60<	0.61<	0.62<	0.63<	0.64<	0.65<
1	0.66<	0.68<	0.68<	0.69<	0.69<	0.69<	0.70<	0.70<	0.71<	0.72<
2	0.72<	0.73<	0.73<	0.74<	0.74<	0.75<	0.76<	0.81<		

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.67	0.07	28	0.55	0.81	18.90
Edit<	0.67	0.07	28	0.55	0.81	18.90

Reflectance Histogram

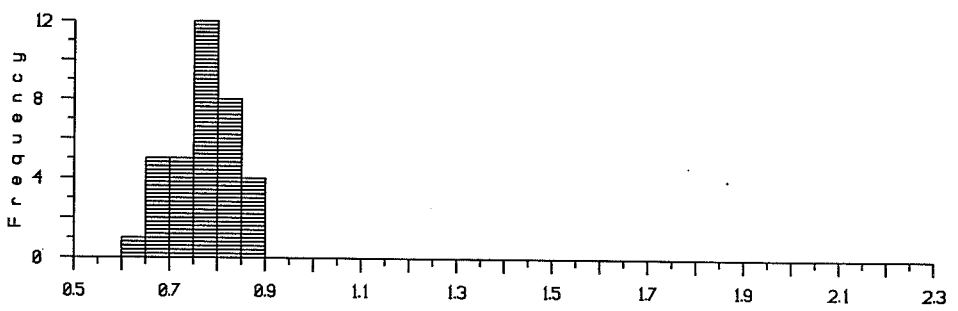


K0867D, 10600-11400', WENONAH J-75

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.62<	0.66<	0.66<	0.67<	0.70<	0.70<	0.71<	0.72<	0.72<	0.73<
1	0.74<	0.75<	0.75<	0.75<	0.76<	0.76<	0.77<	0.78<	0.78<	0.79<
2	0.79<	0.79<	0.79<	0.80<	0.82<	0.83<	0.83<	0.83<	0.83<	0.84<
3	0.84<	0.85<	0.85<	0.86<	0.90<					

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.77	0.07	35	0.62	0.90	26.97
Edit<	0.77	0.07	35	0.62	0.90	26.97

Reflectance Histogram



K0868A, 11400-12040', WENONAH J-75

Col >	1	2	3	4	5	6	7	8	9	0
Row	0.68<	0.72<	0.72<	0.73<	0.76<	0.76<	0.76<	0.78<	0.78<	0.78<
1	0.79<	0.80<	0.80<	0.80<	0.81<	0.82<	0.82<	0.83<	0.83<	0.85<
2	0.86<	0.87<	0.88<	0.89<	0.90<	0.91<	0.92<	0.93<	1.04<	

	Mean	Stand Dev	Pts	Min	Max	Sum
Total	0.82	0.08	29	0.68	1.04	23.82
Edit<	0.82	0.08	29	0.68	1.04	23.82

Reflectance Histogram