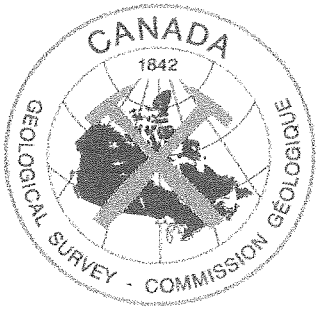

Geological Survey of Canada open file # 3854

Vitrinite reflectance (Ro) of dispersed organics from Petro-Canada et al **Shelburne G-29**

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December 8, 1999

Natural Resources Canada | Ressources naturelles Canada

Canada

Vitrinite reflectance (Ro) of dispersed organics from Petro-Canada et al Shelburne G-29

G.S.C. Locality No.: D280 **Location:** 42.6408°N, 63.5593°W

R.T. Elevation: 24m **Water Depth:** 1153.5m **Total Depth:** 4005m

Sampled Interval: 1620 - 3990m **Interval Studied:** 1650 - 3990m

Depth Units: Meters referenced to R.T. **Rig Release Date:** September 16, 1985

Vitrinite reflectance has been determined on 14 rotary cuttings samples from Petro-Canada et al Shelburne G-29 which was classified as a new field wildcat well and is located on the Scotian Slope approximately 220 km south of Halifax, Nova Scotia. Well status is Plugged and Abandoned.

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

Analysis of the well reveals thermal maturation intervals given in Table I. 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*

Depth in meters	Vitrinite Reflectance (%Ro)**	Maturity for oil generation*
1154(Sea floor)	(0.23)	immature
2970	0.4	immature approaching maturity
3720	0.5	marginally mature
4340	(0.6)	onset of significant oil generation
5320	(0.8)	peak of oil generation
4005(T.D.)	0.54	within oil window

** Actual hydrocarbon products depend on type of organic matter present.*
*** ( )'s indicate Ro has been extrapolated at 0.128 log Ro/km.*

Remarks

Sample coverage for vitrinite reflectance analysis (Figure 1, Table II) was good over the section penetrated at Shelburne G-29. The data were plotted on a log Ro vs. linear depth scale and a linear regression line was calculated and plotted through the data points (Figure 1). The 'error bars' displayed 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 0.128 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 any linear trends present in the Ro data. It also can help to demonstrate 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 of the lower most section of Shelburne G-29 is suitable for the generation and preservation of hydrocarbons within the drilled section, between 3720 and 4005m (T.D.), assuming potential source rocks and traps are present.

Discussion

Results of these Ro based maturation data from this deep-water slope well are similar to two other deep-water wells on the eastern continental margin; Shubenacadie H-100 (Avery, 1999) located on the slope some 260km southwest of Halifax and Gabriel C-60 (Avery, 1985) located in the Flemish Pass. With a water depth of 1476.5m and a total depth of 4200m, a shorter section was penetrated at Shubenacadie H-100 (Fig. 3) compared to 1108.5m and 5171m at Gabriel (Fig.4). The Gabriel well has a slope of 0.159 logRo/km based on 15 measurement points over this range while Shubenacadie has a slope of 0.153 based on 10 points. Maturation slopes for these wells project to 0.2% at approximately 1500m and to about 0.55% at 4200m (T.D. in Shubenacadie). Although the Shelburne well has a very similar maturity at T.D. (0.54%Ro at 4005m) it projects to 0.2%Ro at ~650m. This also is results in a lower slope value of 0.128 logRo/km.

References

Avery, M.P., 1985. Vitrinite Reflectance (Ro) of dispersed organics from Esso Voyager Gabriel C-60. Geological Survey of Canada Open File Report 1206.

Avery, M.P., 1999. Vitrinite Reflectance (Ro) of dispersed organics from Shell et al Shubenacadie H-100. Geological Survey of Canada Open File Report ????.

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

MacLean, B.C. and Wade, J.A., 1993. East coast basin atlas series: seismic markers and stratigraphic picks in Scotian Basin wells. Atlantic Geoscience Centre, Geological Survey of Canada, 276 p.

December 8, 1999

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Table II

Summary of kerogen - based vitrinite reflectance

Sample Labels	Depths in meters	Mean Ro (SD) non-rotated	Number of Readings Total	Edited
K0878A	1650-1690	0.28 (±0.04)	10	10
K0878B	1830-1840	0.28 (±0.06)	7	7
K0878C	1950-1990	0.31 (±0.03)	11	11
K0878D	2130-2170	0.28 (±0.02)	7	7
K0879A	2280-2320	0.34 (±0.04)	13	13
K0879B	2430-2440	0.37 (±0.05)	6	6
K0879C	2670-2680	0.40 (±0.04)	4	4
K0879D	2820-2890	0.37 (±0.05)	14	14
K0880A	3000-3010	0.45 (±0.05)	5	5
K0880B	3150-3190	0.39 (±0.04)	14	14
K0880C	3390-3430	0.43 (±0.05)	13	13
K0880D	3600-3640	0.45 (±0.06)	18	18
K0881A	3780-3790	0.55 (±0.05)	12	12
K0881B	3980-3990	0.56 (±0.08)	8	8

Table III

Formation Tops (MacLean and Wade, 1993)

Formation	Depth to top
Banquereau	in casing
(Wyandot equiv.)	2612m
Dawson Canyon	3110m
(Petrel Mbr)	3194m
Shortland Shale	3288m
Verrill Canyon	3740m
Roseway equiv.	3985m
Total Depth	4005m

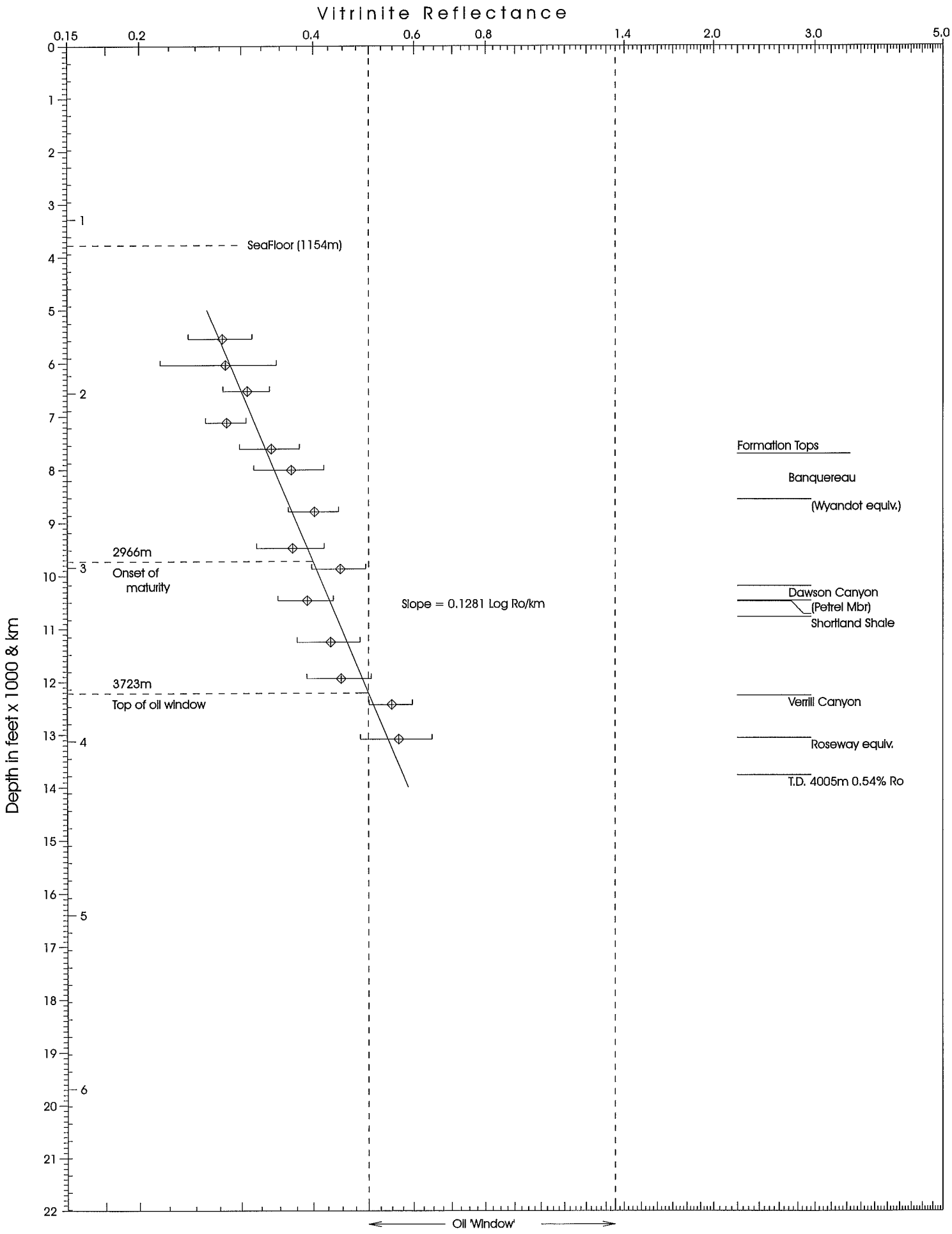


Fig. 1 SHELBURNE G-29

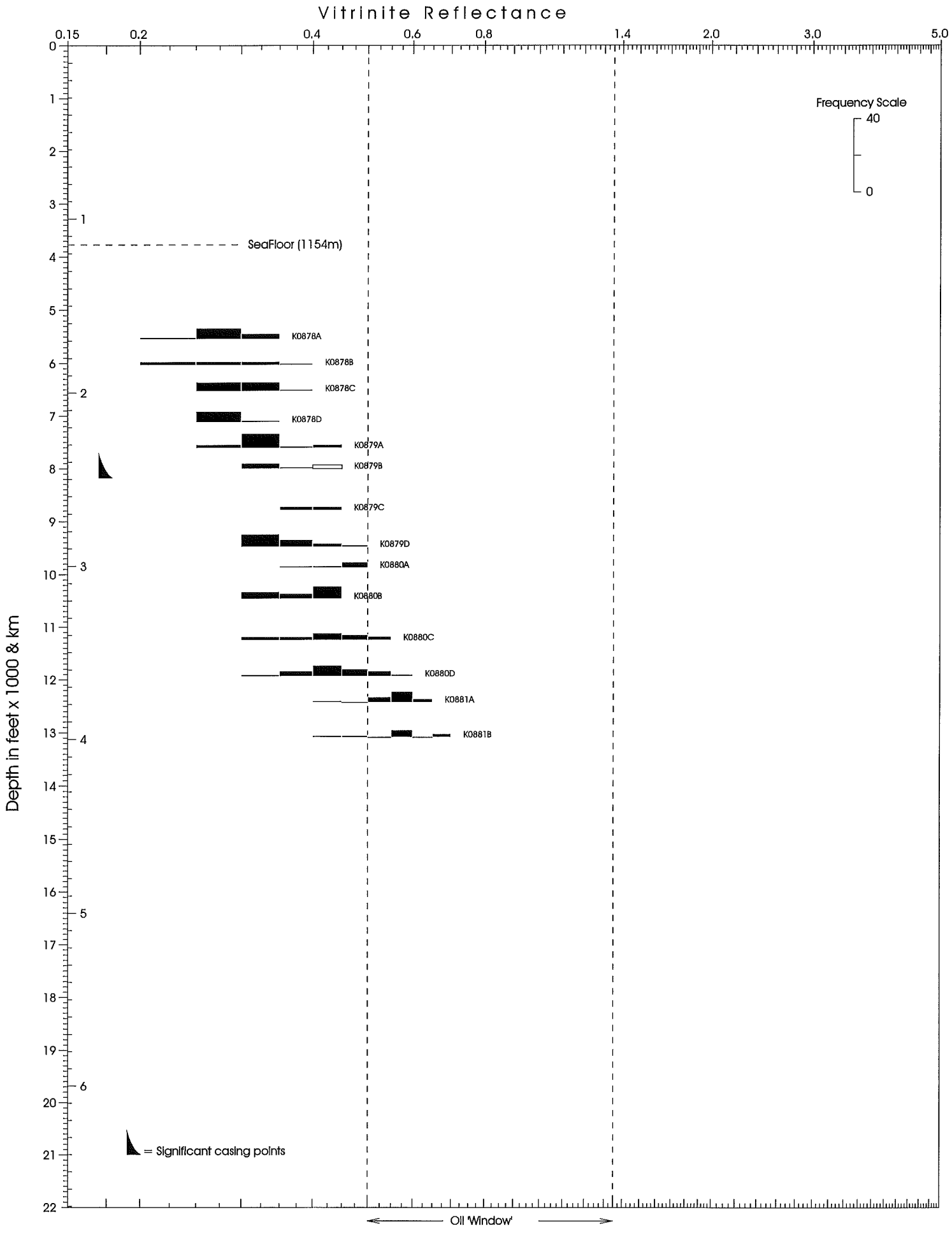


Fig. 2 SHELBURNE G-29 <Histograms>

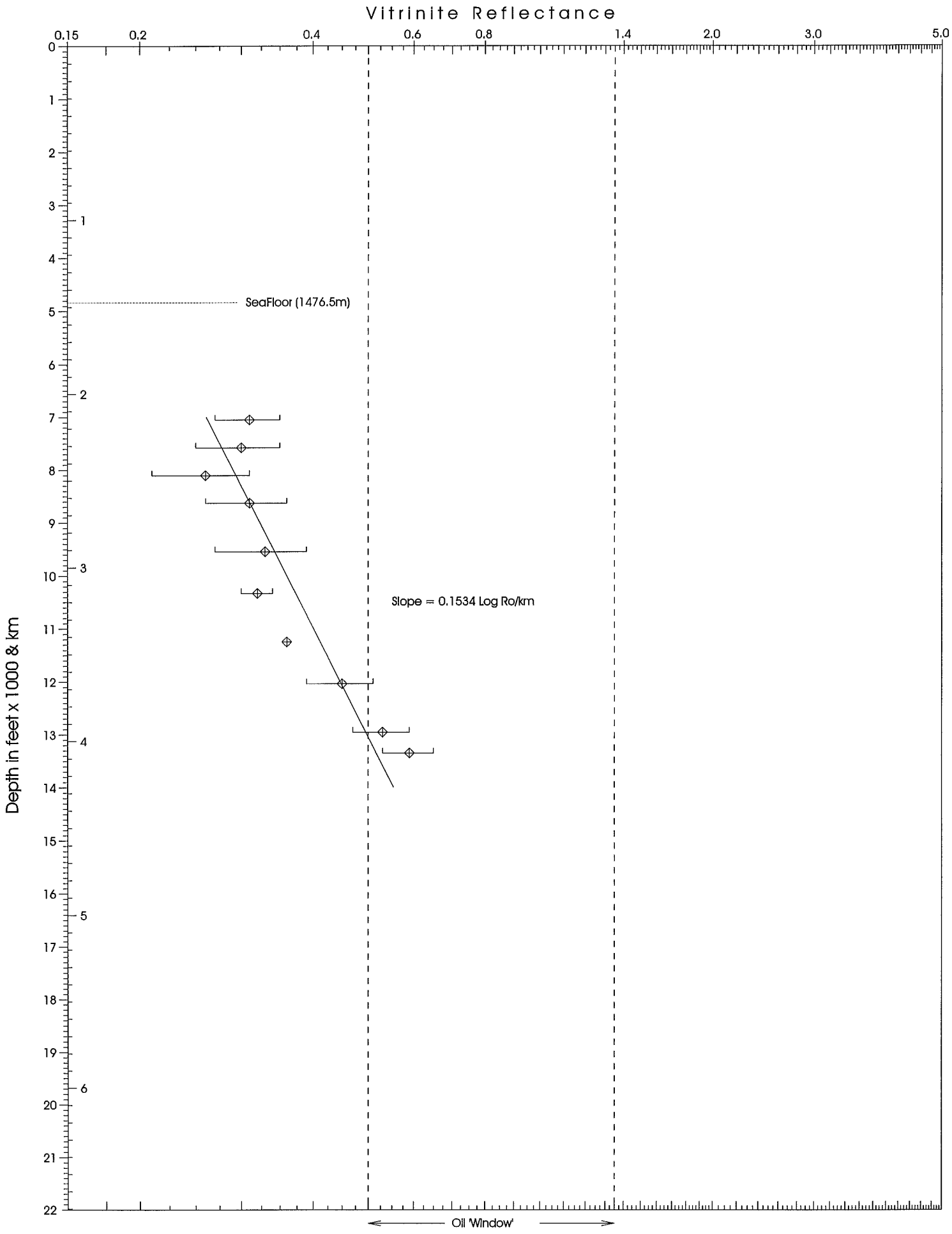


Fig. 3 SHUBENACADIE H-100 (plot included for comparison)

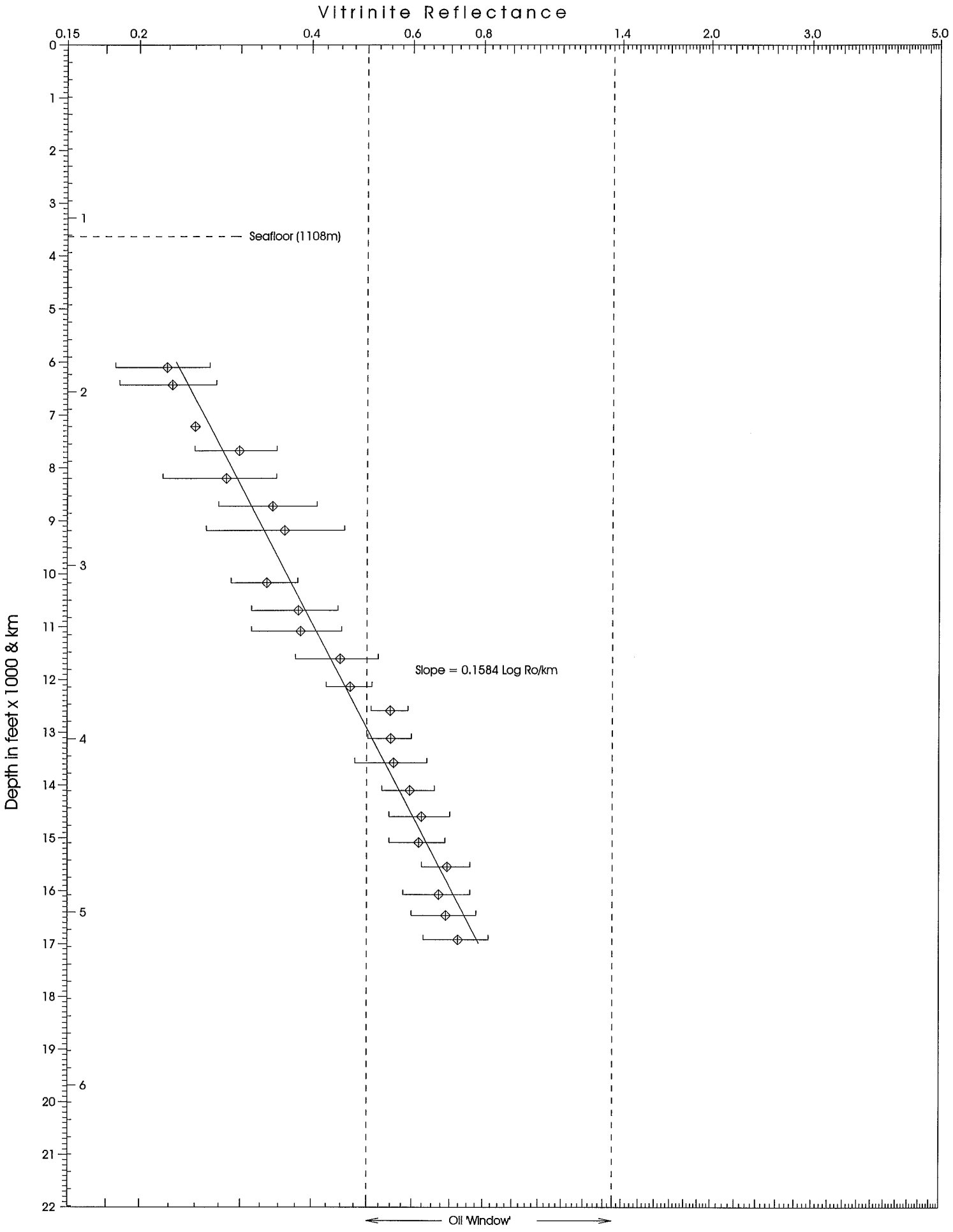


Fig. 4 GABRIEL C-60 (plot included for comparison)

APPENDIX I

Sample Preparation Method

COGLA Lab preparation

Preliminary Wash
Samples dried 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:

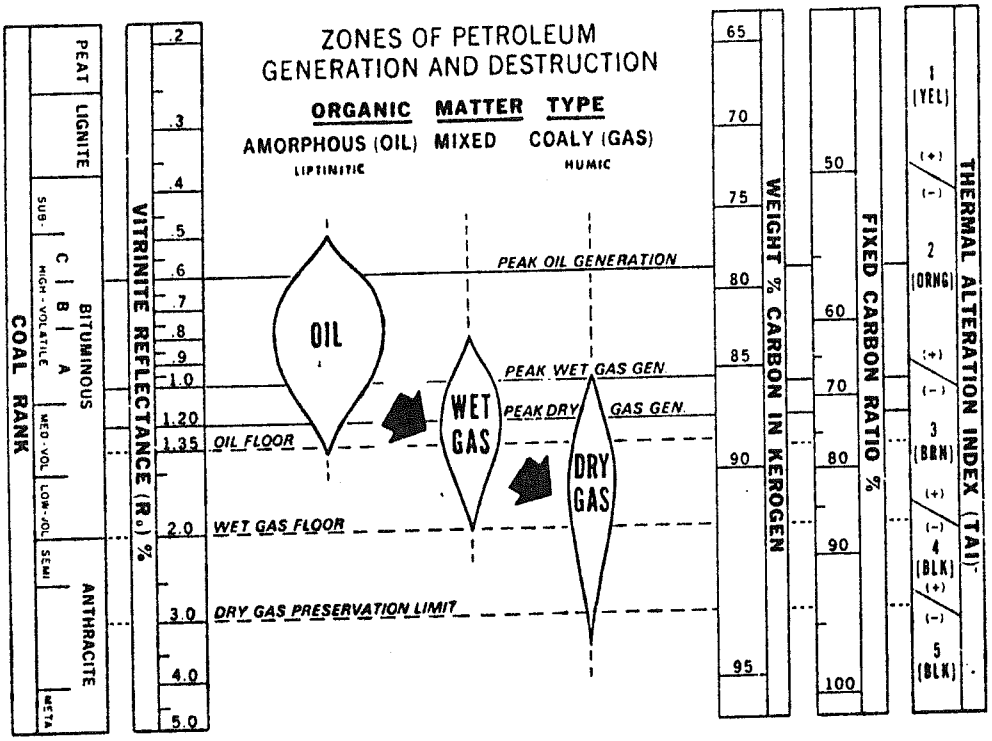
PALYNOLOGY Lab preparation

20-30 grams placed in 250 ml plastic beaker.
Add 10% HC1 till reaction ceases (removes carbonates).
Washed (rinsed) 3 times.
Conc. HF overnight (removes silicates).
Washed (rinsed) 3 times.
Heated (60-65°C) conc. HC1 (remove fluorides caused by HF).
Washed 3 times.
Then put into 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.

VITRINITE REFLECTANCE Lab preparation

Excess water pipetted off.
Freeze dried.
Mounted using epoxy resin (EPO-TEK 301) in predrilled plastic stubs.
Polished using modified coal petrology polishing methods.
Examined under oil lens 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'

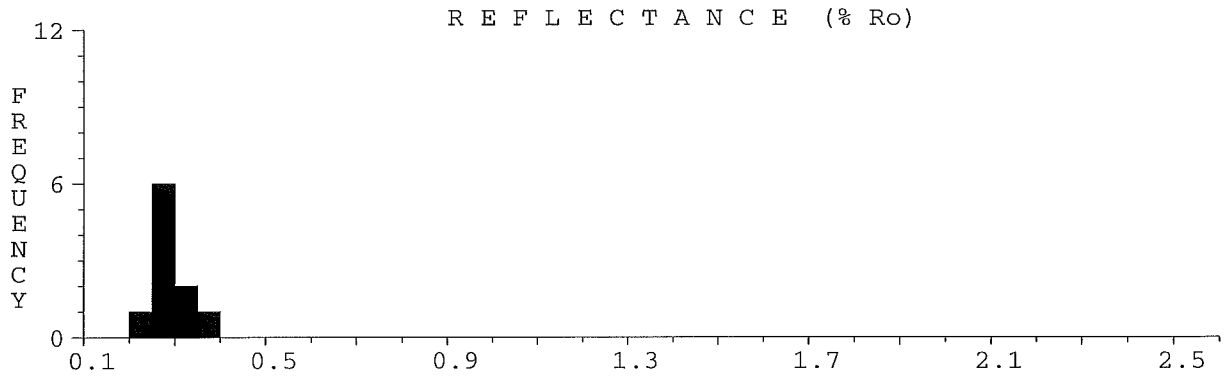
Appendix III

Reflectance Histograms

File: K0878A

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.22)	(0.25)	(0.26)	(0.26)	(0.27)	(0.28)	(0.29)	(0.30)	(0.30)	(0.35)

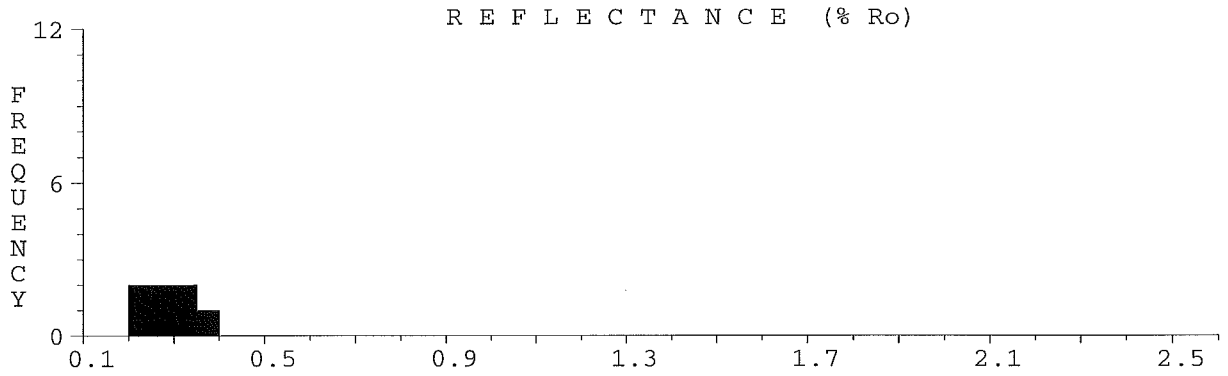
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.28	0.04	10	0.22	0.35
(Edit)	0.28	0.04	10	0.22	0.35



File: K0878B

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.22)	(0.22)	(0.25)	(0.25)	(0.31)	(0.33)	(0.39)			

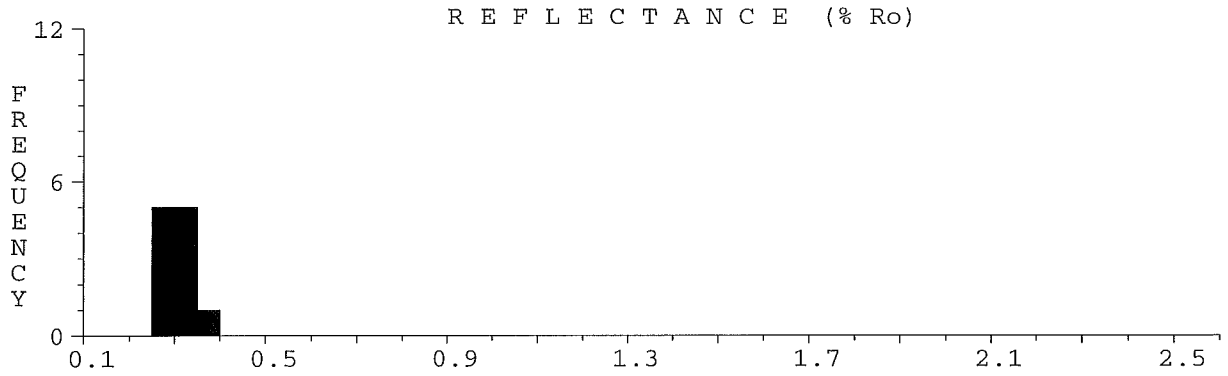
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.28	0.06	7	0.22	0.39
(Edit)	0.28	0.06	7	0.22	0.39



File: K0878C

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.27)	(0.28)	(0.29)	(0.29)	(0.29)	(0.31)	(0.31)	(0.31)	(0.32)	(0.34)
1	(0.37)									

	Mean	Stand.Dev.	Pts	Min	Max
Total	0.31	0.03	11	0.27	0.37
(Edit)	0.31	0.03	11	0.27	0.37



File: K0878D

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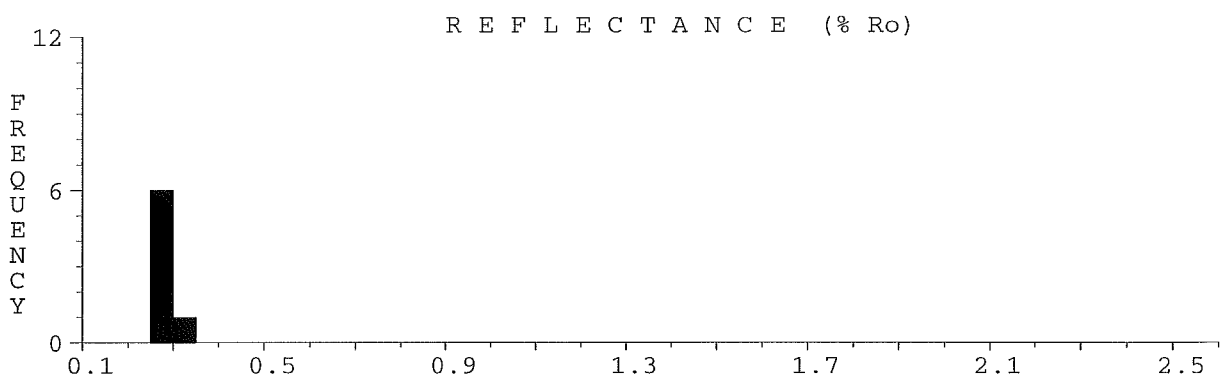
Row 0	(0.25)	(0.26)	(0.28)	(0.29)	(0.29)	(0.29)	(0.32)			

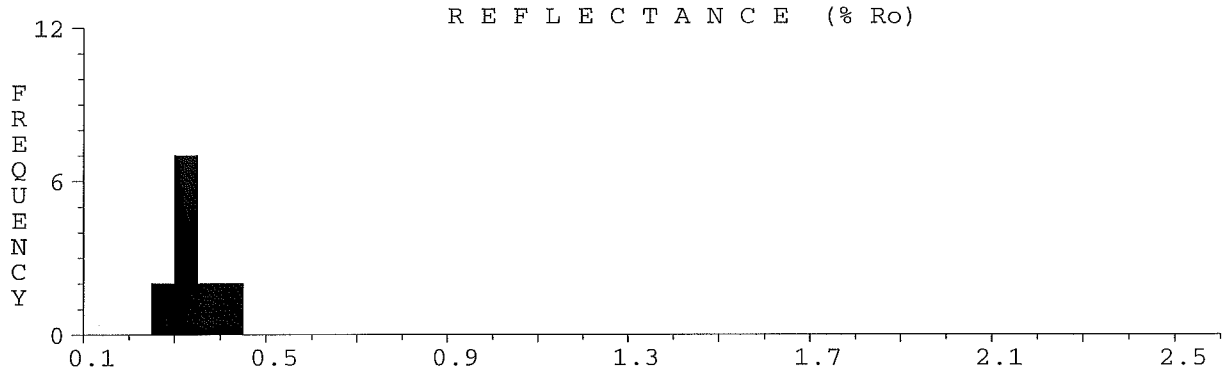
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.28	0.02	7	0.25	0.32
(Edit)	0.28	0.02	7	0.25	0.32



File: K0879A

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.28)	(0.29)	(0.31)	(0.32)	(0.32)	(0.33)	(0.33)	(0.34)	(0.34)	(0.35)
1	(0.36)	(0.41)	(0.42)							

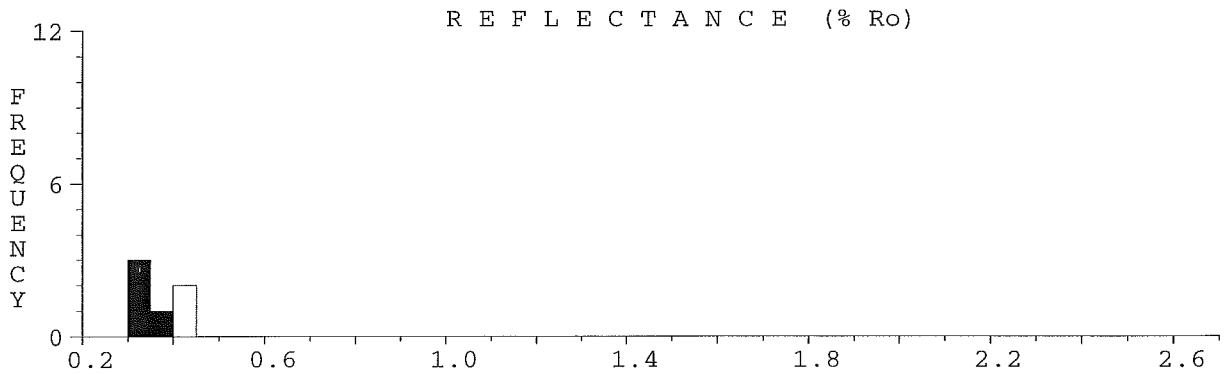
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.34	0.04	13	0.28	0.42
(Edit)	0.34	0.04	13	0.28	0.42



File: K0879B

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.30)	(0.34)	(0.34)	(0.37)	0.41	0.44				

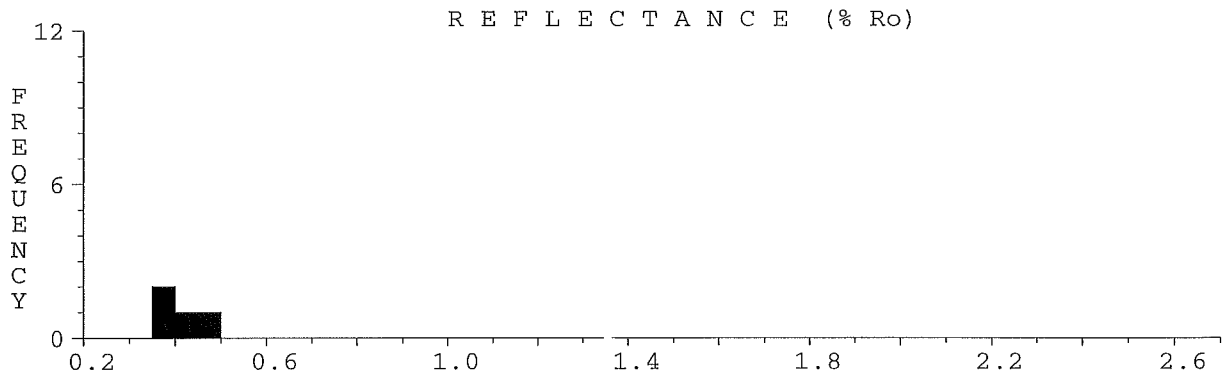
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.37	0.05	6	0.30	0.44
(Edit)	0.34	0.03	4	0.30	0.37



File: K0879C

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.36)	(0.38)	(0.42)	(0.45)						

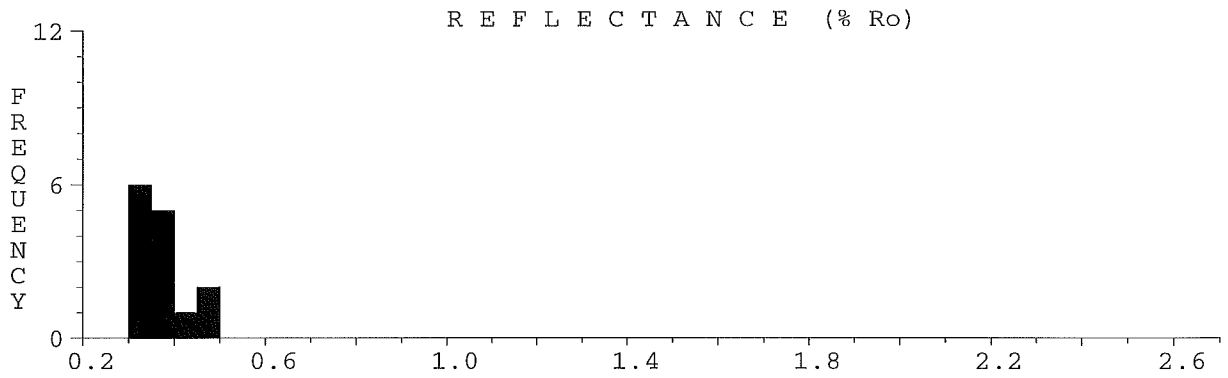
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.40	0.04	4	0.36	0.45
(Edit)	0.40	0.04	4	0.36	0.45



File: K0879D

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.31)	(0.32)	(0.32)	(0.34)	(0.34)	(0.34)	(0.35)	(0.36)	(0.38)	(0.38)
1	(0.39)	(0.40)	(0.45)	(0.48)						

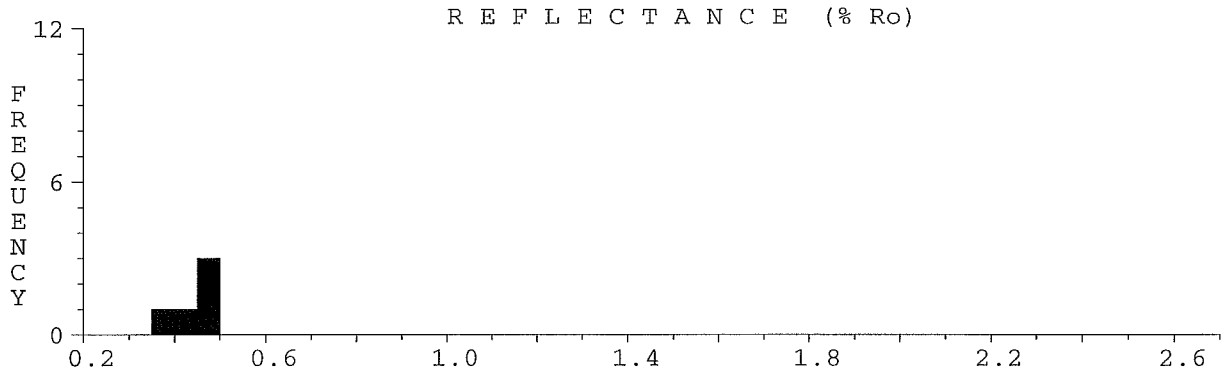
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.37	0.05	14	0.31	0.48
(Edit)	0.37	0.05	14	0.31	0.48



File: K0880A

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.37)	(0.43)	(0.46)	(0.48)	(0.49)					

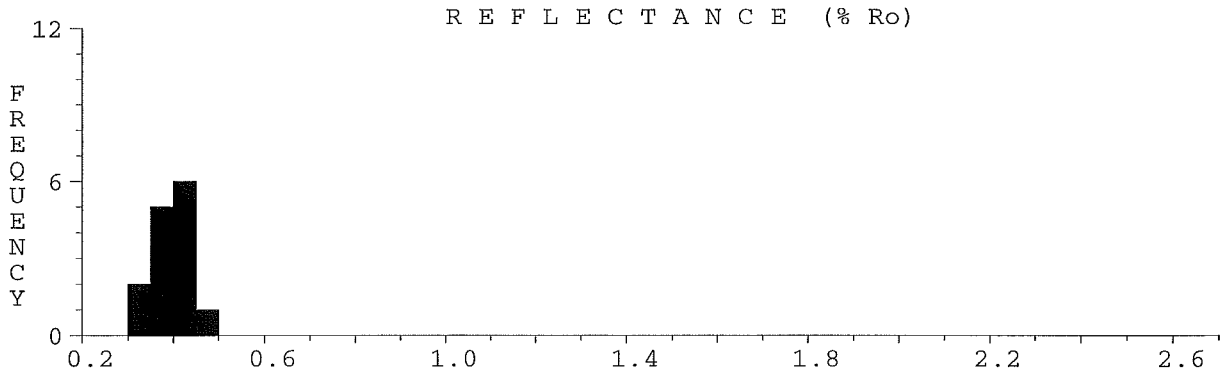
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.45	0.05	5	0.37	0.49
(Edit)	0.45	0.05	5	0.37	0.49



File: k0880b

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.31)	(0.34)	(0.35)	(0.35)	(0.36)	(0.38)	(0.39)	(0.41)	(0.41)	(0.42)
1	(0.42)	(0.44)	(0.44)	(0.45)						

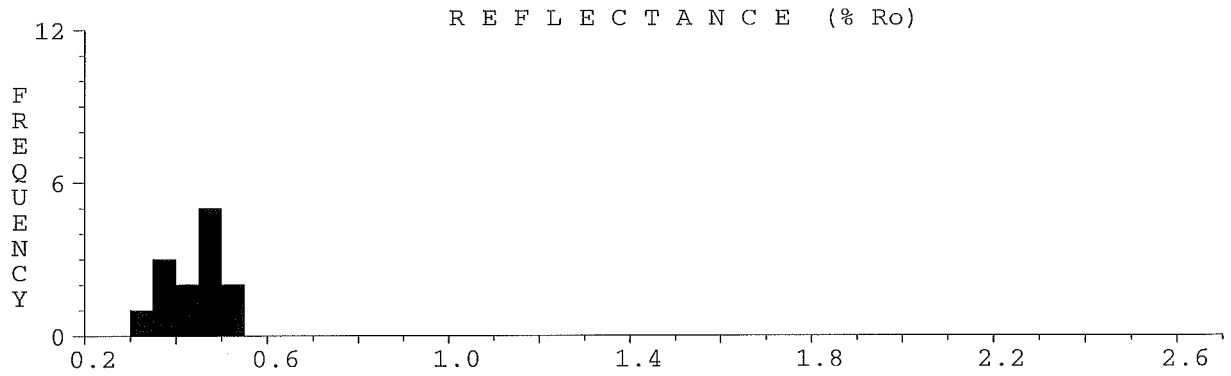
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.39	0.04	14	0.31	0.45
(Edit)	0.39	0.04	14	0.31	0.45



File: K0880C

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.34)	(0.35)	(0.38)	(0.38)	(0.41)	(0.42)	(0.45)	(0.45)	(0.46)	(0.47)
1	(0.47)	(0.50)	(0.50)							

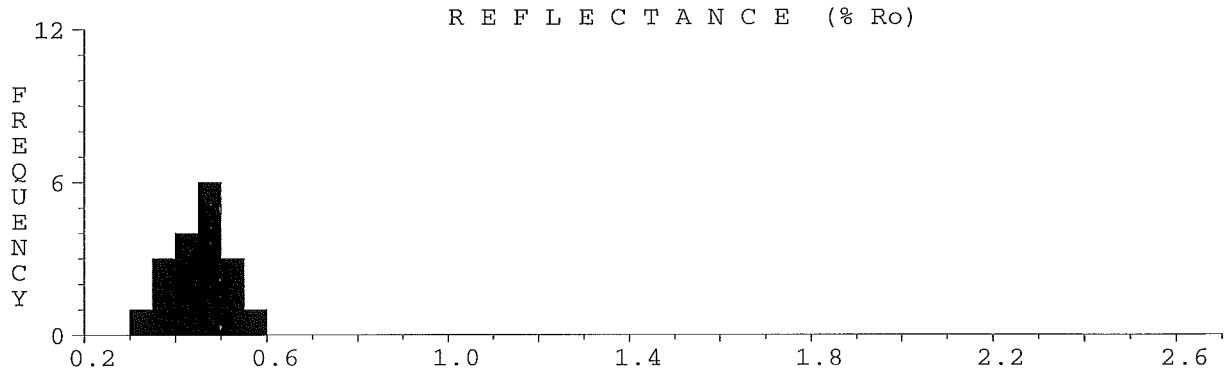
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.43	0.05	13	0.34	0.50
(Edit)	0.43	0.05	13	0.34	0.50



File: K0880D

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.34)	(0.36)	(0.38)	(0.38)	(0.42)	(0.43)	(0.44)	(0.44)	(0.45)	(0.45)
1	(0.46)	(0.46)	(0.47)	(0.48)	(0.51)	(0.52)	(0.52)	(0.55)		

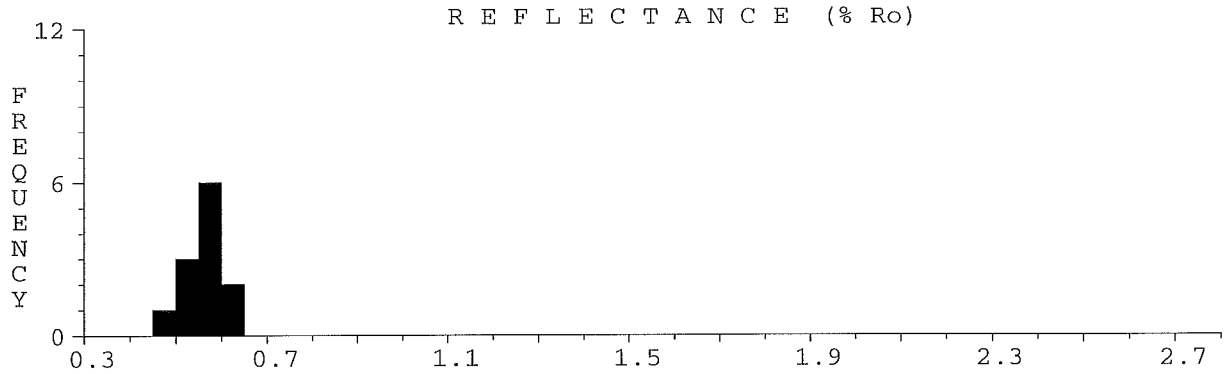
	Mean	Stand.Dev.	Pts	Min	Max
Total	0.45	0.06	18	0.34	0.55
(Edit)	0.45	0.06	18	0.34	0.55



File: K0881A

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.45)	(0.50)	(0.50)	(0.54)	(0.55)	(0.55)	(0.56)	(0.56)	(0.57)	(0.58)
1	(0.61)	(0.62)								

	Mean	Stand.Dev.	Pts	Min	Max
Total	0.55	0.05	12	0.45	0.62
(Edit)	0.55	0.05	12	0.45	0.62



File: K0881B

Col>	1	2	3	4	5	6	7	8	9	0
Row 0	(0.45)	(0.48)	(0.55)	(0.55)	(0.56)	(0.58)	(0.66)	(0.69)		

	Mean	Stand.Dev.	Pts	Min	Max
Total	0.56	0.08	8	0.45	0.69
(Edit)	0.56	0.08	8	0.45	0.69