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GEOLOGICAL SURVEY OF CANADA

OPEN FILE 4627

Vitrinite reflectance (Ro) of dispersed organic matter from Chevron-PEX-Shell Acadia K-62

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Well information

G.S.C. Locality No.: D171 **Unique Well ID:** 300 K62 43000 61450 **Location:** 42.86222°N, 61.91737°W

R.T. Elevation: 12.8 m **Water Depth:** 866.3 m **Total Depth:** 5287.4 m

Sampled Interval: 1200 - 5287 m **Interval Studied:** 1988-4423 m

Depth Units: Metres referenced to R.T. **Rig Release Date:** August 2, 1978

Introduction

Vitrinite reflectance has been determined on kerogen obtained from 12 rotary cutting samples from Chevron-PEX-Shell Acadia K-62, which was classified as an exploratory well and is located on the slope of the Scotian Shelf, approximately 237 km southeast of Halifax, Nova Scotia. Well status is Plugged and Abandoned.

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

Analysis of the well reveals thermal maturity intervals given in Table I. Specific maturity levels, as set out in this report, are based on those of Dow (1977) with modified terminology (Appendix II).

Table I
Inferred Hydrocarbon Thermal Maturity Levels*

Depth in metres*	Vitrinite Reflectance* %Ro	Hydrocarbon generation levels**
866 [Sea floor]	(0.37)	immature
1400	0.4	immature approaching maturity
2680	0.5	marginally mature
3730	0.6	onset of significant oil generation
5287 [T.D.]	(0.79)	approx. peak of oil generation

*() indicate Ro's or depths extrapolated from linear regression slope of 0.075 log Ro/km.

**Actual hydrocarbon products depend on type of organic matter present.

Remarks

Sample coverage of vitrinite reflectance analysis (Figure 1, Table II) was uneven over the section penetrated between 1988 and 4423 m at Acadia K-62. Coverage was very dense between 1988 to 2574 m. No kerogen was available from the lower section of the well. The data were plotted on a log Ro vs. linear depth scale and regression lines were calculated and plotted (Figure 1). The 'error bars' displayed on the maturity profile indicate one standard deviation on either side of the mean and may be deceptively small for samples with very few readings. The slope of the maturity line is 0.075 log Ro/km.

The histogram display shows the variability in the reflectance populations, which represent the maturity of the sediments with depth (Figure 2). Plotting reflectance histograms on a log scale may help reveal any trends present in the Ro data. It also can help to demonstrate the effects of cavings, geology, casing points and other influences on the vitrinite reflectance populations.

These vitrinite reflectance data indicate, by projection of the maturity trend, that the thermal regime of the lower section of Acadia K-62 is suitable to generate and preserve liquid hydrocarbons within the drilled section, between 2680 and 5287.4 m (T. D.), provided potential source rocks and traps are present.

Discussion

Due to the density of kerogen available from the upper section of the well there is considerable confidence in the maturity of this segment of the trend line. Conversely, the lower section is anchored with only one sample at 4423 m which itself yielded a small number of somewhat dispersed readings (see standard deviation of 'Total' population for sample K0017C in Appendix III).

Therefore there is little confidence in projecting the maturity trend below the upper section based on only one data point at 4423 m. Omitting this deeper value from the linear regression yields a much higher maturation slope. This alternate slope would project to the 'surface' at about 0.23%Ro. Maturation slopes typically intersect the 'surface' at close to 0.2%Ro (Dow, 1977). The slope calculated using all the values would intersect the 'surface' at about 0.35%Ro. On the other hand, the projection of the alternate slope would result in a very high maturation in the lower section of the well. This slope would indicate that the section below about 4250 m would be over-mature for production and preservation of oil. It would also project to 2.3%Ro at T.D. which is well into the 'dry gas window'.

References

Dow, W. G.

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

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Table II

Summary of kerogen - based vitrinite reflectance

Sample Labels	Depth in metres	Mean Ro (SD) non-rotated	Number of Readings	
			Total	Edited
K0015A	1988-1998	0.41 (± 0.06)	12	11
K0015B	2078-2088	0.42 (± 0.06)	11	11
K0015C	2108-2118	0.47 (± 0.07)	6	6
K0016A	2138-2148	0.45 (± 0.05)	6	6
K0016B	2168-2178	0.44 (± 0.04)	12	12
K0016C	2288-2298	0.46 (± 0.02)	4	4
K0017A	2378-2388	0.52 (± 0.06)	14	14
K0017B	2564-2574	0.56 (± 0.07)	7	7
K0017C	4413-4423	0.65 (± 0.08)	10	8

Table III

Formation Tops (MacLean, B.C. & Wade, J.A., 1993)

Formation	Depth in metres
Banquereau	in casing
Wyandot	2593.4
Dawson Canyon	2620.1
Petrel Mbr	2714.4-2725
Roseway Equiv	2778
(unconformity)	2778
Abenaki	3306
Baccaro Mbr	3306-4086
Misaine Mbr	4086
Scatarie Mbr	4304
Mohican Equiv	4950
Total Depth	5287.4

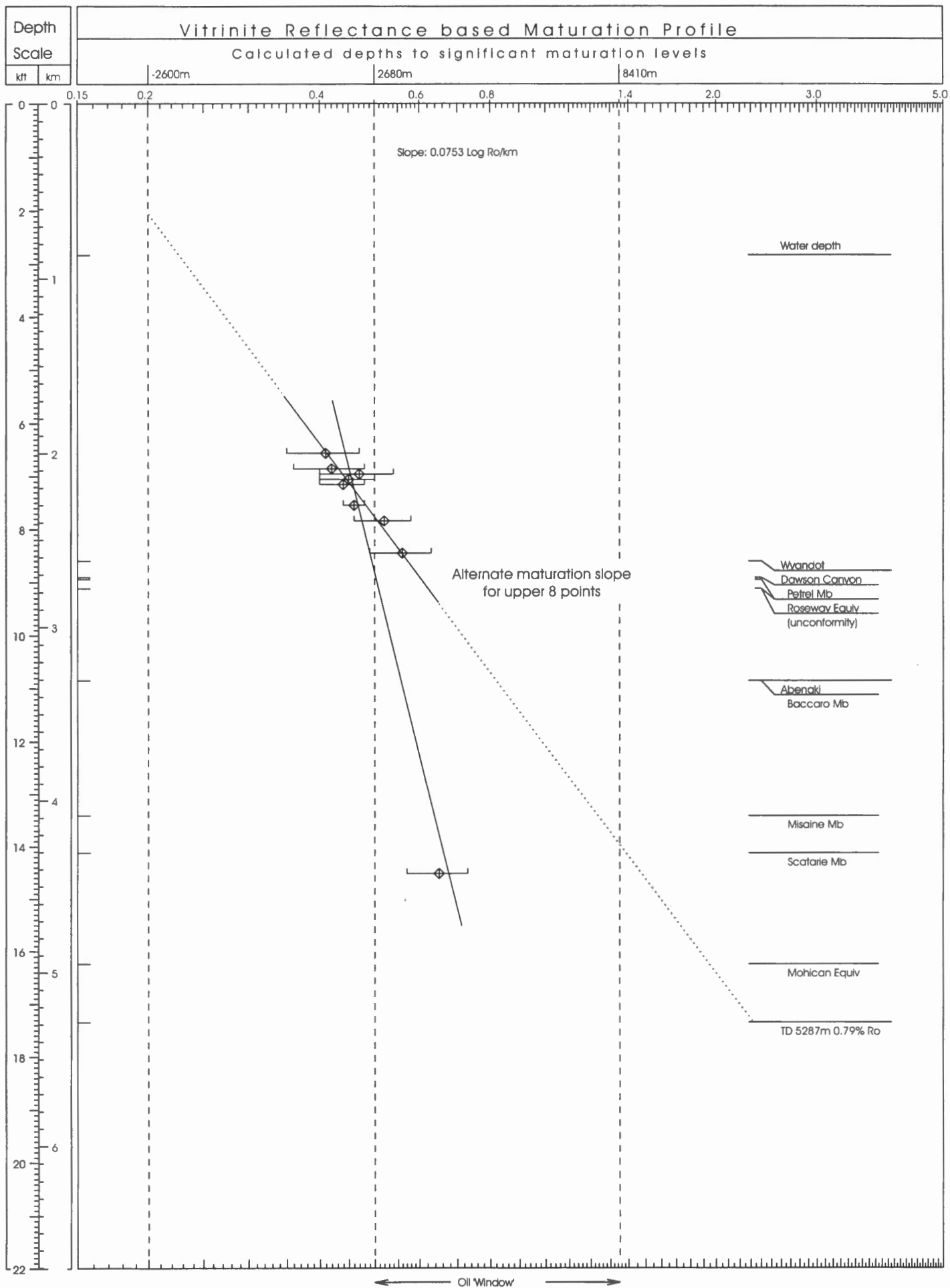


Fig. 1 Acadia K-62

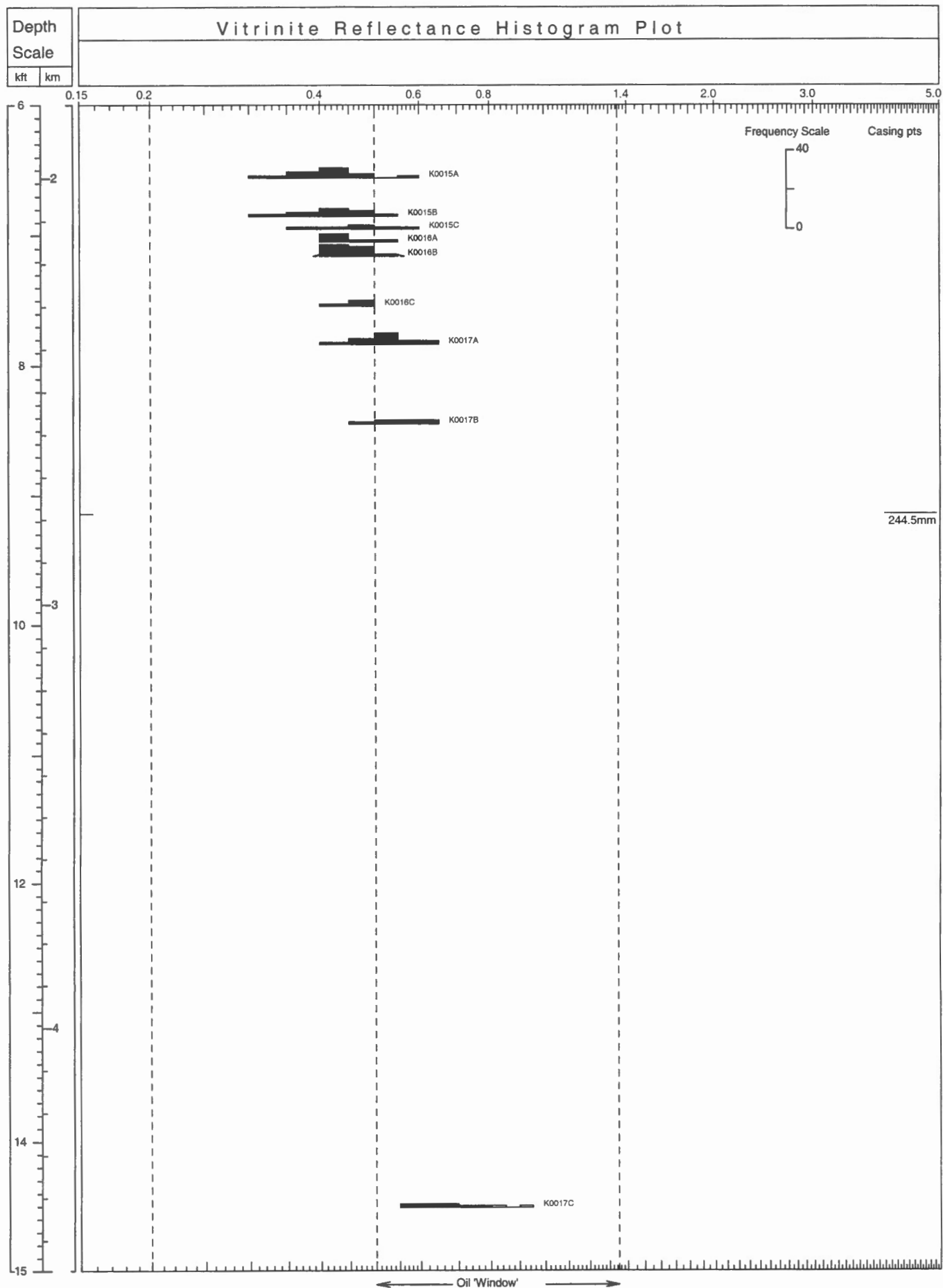


Fig. 2 Acadia K-62 <Histograms>

Appendix I

Sample Preparation Method

Kerogen Concentrate

Preliminary wash (preparation for cuttings)

Dry samples in oven (25°C)

PALYNOLOGY Lab preparation

Place 20-30 grams in 250 ml plastic beaker.

Add 10% HCl till reaction ceases (removes carbonates).

Rinse 3 times.

Immerse in hot concentrated HF overnight (removes silicates).

Rinse 3 times.

Heat (60-65°C) in concentrated HCl (removes fluorides caused by HF).

Rinse 3 times.

Transfer to 15 ml test tube with 4-5 ml 4% Alconox.

Centrifuge at 1500 rpm for 90 sec.

Decant.

Rinse and centrifuge 3 times.

Float off organic fraction using 2.0 S.G. ZnBr solution.

Centrifuge at 1000 rpm for 8 min.

Float fraction into second test tube.

Wash and centrifuge 3 times.

Make kerogen smear slide.

Remaining kerogen material is made available to Organic Petrology Lab.

VITRINITE REFLECTANCE Lab preparation

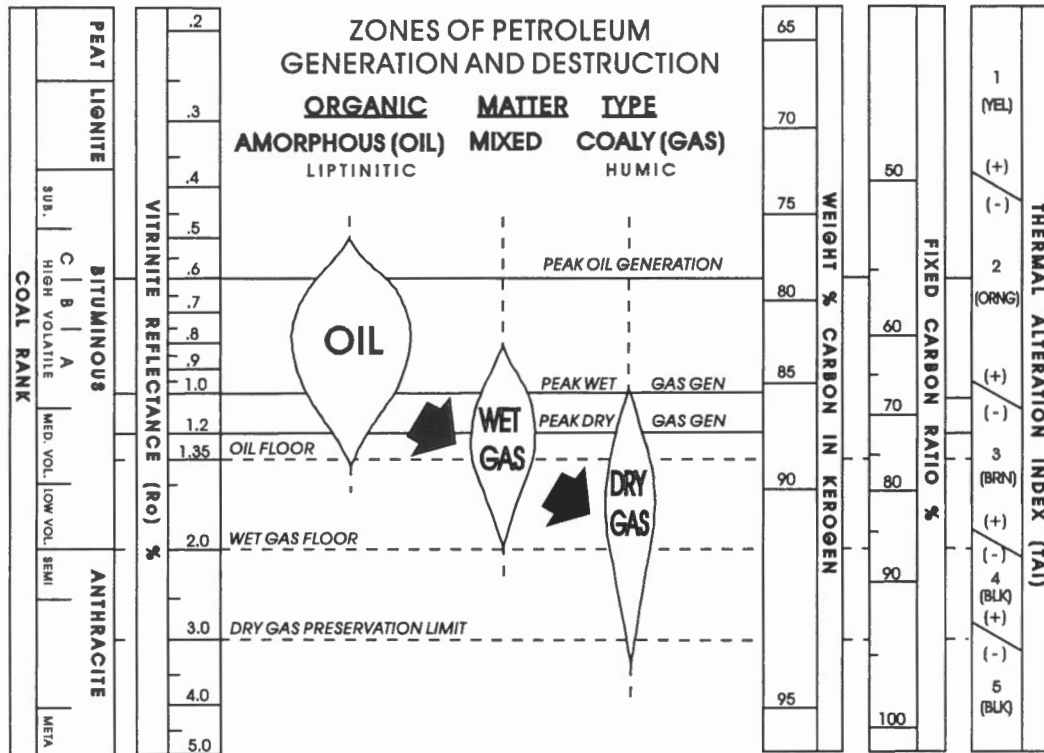
Pipette off excess water and prepare as 2.5 cm (1") diameter plastic stubs to fit polisher.

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 magnification.

Appendix II (Dow, 1977)



Note: In this report, the terminology used to describe the various maturity levels has been modified. The 'peak' designation, as used in this figure, has been changed to 'onset of significant' and 0.8 %Ro is herein used as the 'peak of oil generation' (Table I, Figure 1).

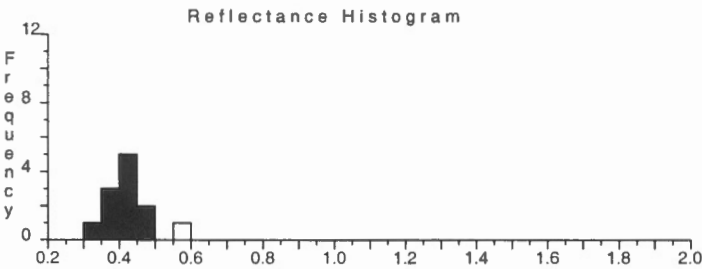
Appendix III

Data listings and basic statistics

Data listings and basic statistics for: Acadia K-62

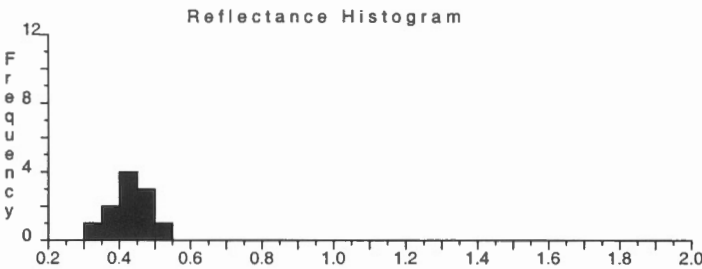
K0015A, 1988-1998m

Col >	1	2	3	4	5	6	7	8	9	0
Row	(0.49)	(0.56)	(0.42)	(0.30)	(0.42)	(0.43)	(0.49)	(0.37)	(0.41)	(0.43)
1	(0.39)	(0.36)								
Total	Mean	Stand Dev	Pts	Min	Max	Sum				
(Edit)	0.42	0.07	12	0.30	0.56	5.07				
	0.41	0.06	11	0.30	0.49	4.51				



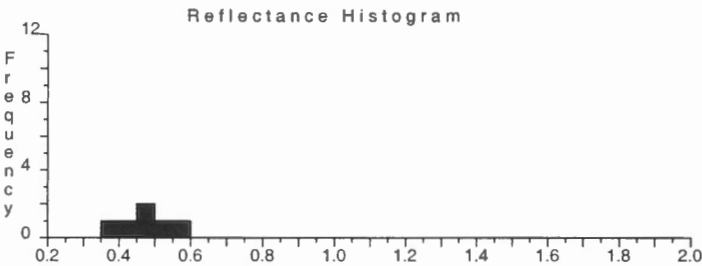
K0015B, 2078-2088m

Col >	1	2	3	4	5	6	7	8	9	0
Row	(0.31)	(0.36)	(0.44)	(0.44)	(0.50)	(0.48)	(0.41)	(0.45)	(0.41)	(0.38)
1	(0.49)									
Total	Mean	Stand Dev	Pts	Min	Max	Sum				
(Edit)	0.42	0.06	11	0.31	0.50	4.67				
	0.42	0.06	11	0.31	0.50	4.67				



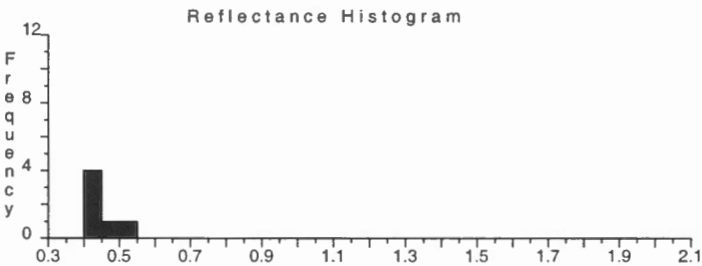
K0015C, 2108-2118m

Col >	1	2	3	4	5	6
Row	(0.38)	(0.45)	(0.43)	(0.47)	(0.54)	(0.55)
Total	Mean	Stand Dev	Pts	Min	Max	Sum
(Edit)	0.47	0.07	6	0.38	0.55	2.82
	0.47	0.07	6	0.38	0.55	2.82



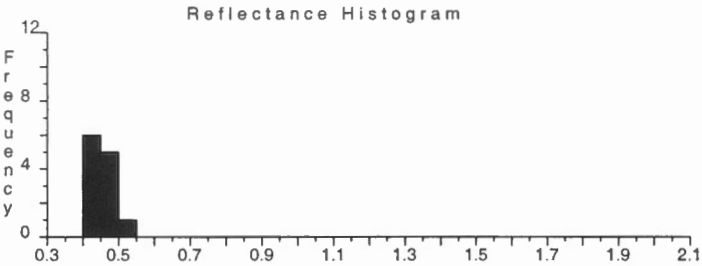
K0016A, 2138-2148m

Col >	1	2	3	4	5	6
Row	(0.44)	(0.41)	(0.42)	(0.49)	(0.54)	(0.42)
Total	Mean	Stand Dev	Pts	Min	Max	Sum
(Edit)	0.45	0.05	6	0.41	0.54	2.72
	0.45	0.05	6	0.41	0.54	2.72



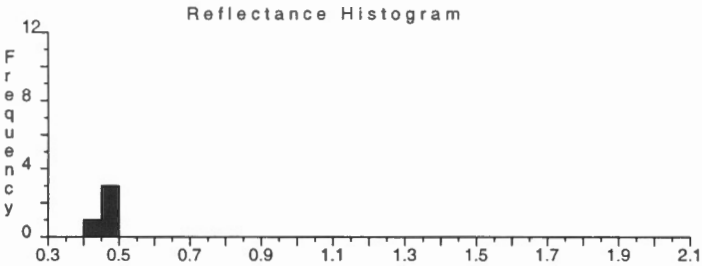
K0016B, 2168-2178m

Col >	1	2	3	4	5	6	7	8	9	0
Row	(0.45)	(0.52)	(0.42)	(0.48)	(0.40)	(0.43)	(0.41)	(0.45)	(0.41)	(0.47)
1	(0.48)	(0.42)								
Total	Mean	Stand Dev	Pts	Min	Max	Sum				
(Edit)	0.44	0.04	12	0.40	0.52	5.34				
	0.44	0.04	12	0.40	0.52	5.34				



K0016C, 2288-2298m

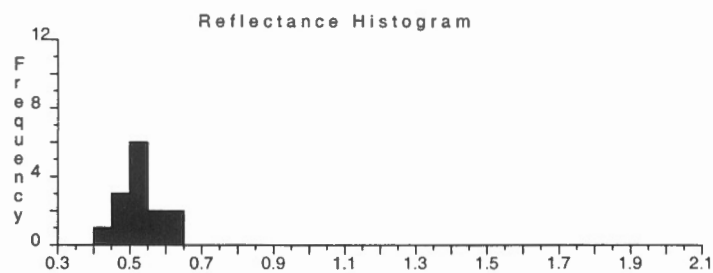
Col >	1	2	3	4		
Row	(0.43)	(0.46)	(0.47)	(0.48)		
Total	Mean	Stand Dev	Pts	Min	Max	Sum
(Edit)	0.46	0.02	4	0.43	0.48	1.84
	0.46	0.02	4	0.43	0.48	1.84



Data listings and basic statistics for: Acadia K-62

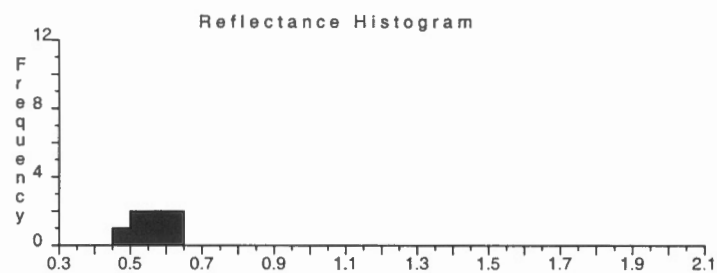
K0017A, 2378-2388m

Col >	1	2	3	4	5	6	7	8	9	0
Row	(0.42)	(0.58)	(0.51)	(0.50)	(0.45)	(0.49)	(0.50)	(0.62)	(0.57)	(0.50)
1	(0.45)	(0.54)	(0.51)	(0.60)						
	Mean	Stand Dev	Pts	Min	Max	Sum				
Total	0.52	0.06	14	0.42	0.62	7.24				
(Edit)	0.52	0.06	14	0.42	0.62	7.24				



K0017B, 2564-2574m

Col >	1	2	3	4	5	6	7
Row	(0.64)	(0.46)	(0.53)	(0.51)	(0.64)	(0.58)	(0.58)
	Mean	Stand Dev	Pts	Min	Max	Sum	
Total	0.56	0.07	7	0.46	0.64	3.94	
(Edit)	0.56	0.07	7	0.46	0.64	3.94	



K0017C, 4413-4423m

Col >	1	2	3	4	5	6	7	8	9	0
Row	(0.77)	(0.57)	(0.69)	(0.55)	(0.72)	(0.62)	(0.67)	(0.61)	0.90	0.83
	Mean	Stand Dev	Pts	Min	Max	Sum				
Total	0.69	0.11	10	0.55	0.90	6.93				
(Edit)	0.65	0.08	8	0.55	0.77	5.20				

