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Vitrinite reflectance (Ro)  
of dispersed organics  
from  
Husky-Bow Valley et al  
Archer K-19

Eastern Petroleum Geology Subdivision  
Atlantic Geoscience Centre, G.S.C., Dartmouth  
October 10, 1987

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OTTAWA

Vitrinite reflectance (Ro) of dispersed organics from Husky-Bow Valley et al  
Archer K-19

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G.S.C. Locality No.: D254                      Location: 46°38'43.17"N, 48°02'18.42"W

R.T. Elevation: 21.7m                      Water Depth: 118.9m                      Total Depth: 4299m

Sample Interval: 902 - 4299m                      Interval Studied: 950 - 4250m

Depth Units: Meters referenced to R.T.

Vitrinite reflectance has been determined on 13 rotary cuttings samples (Table II) from Husky-Bow Valley et al Archer K-19 which was classified as a wildcat well and is located on the Grand Banks approximately 368 km east-southeast of St. John's, Newfoundland.

Data acquisition and manipulation for this report utilized the Zeiss Photo-multiplier III Zonax system interfaced with an IBM-PC AT clone microcomputer to provide improved speed and reliability of data acquisition.

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

Table I  
Inferred Thermal Maturation Levels\*

(Seafloor)-2045m	0.20 - 0.4	% Ro	immature
2045-2697m	0.4 - 0.5	% Ro	immature approaching maturity
2697-3230m	0.5 - 0.6	% Ro	marginally mature
3230m	0.6	% Ro	onset of significant oil generation
4071m	0.8	% Ro	peak of oil generation
4299m T.D.	0.86	% Ro	peak of oil generation
(4724m)	1.0	% Ro	onset of significant wet gas generation
(5257m)	1.2	% Ro	onset of significant dry gas generation
(5601m)	1.35	% Ro	oil floor
(6751m)	2.0	% Ro	wet gas preservation limit

Note: ( ) indicate depth extrapolated at 0.149 log Ro/km

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

## Remarks

Sample coverage of vitrinite reflectance data (Figure I, Table II) was adequate over most of the section penetrated by Archer K-19. The data are plotted on a log  $R_o$  vs. linear depth scale and a linear regression line was calculated by the least squares method. The 'error bars' plotted on the maturation profile (Figure 1) 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 maturation line is 0.149 log/km.

Selection of the reflectance population which represented the true maturation of the sediments was significantly aided by a histogram display plot (Figure 2). This interpretation tool helps to reveal linear trends (populations) in the  $R_o$  data. It also demonstrates the effects of cavings, geology, casing points and other factors on the vitrinite reflectance populations.

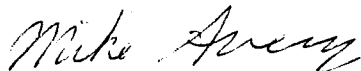
The lithology strip plot (Figure 1) was produced directly from the E.P.G. LITHFILE database which extracts data from digitized CANSTRAT logs.

The vitrinite reflectance data provides evidence that the thermal regime at Archer K-19 was suitable for the generation and preservation of hydrocarbons within the drilled section assuming potential source rocks and traps were present.

## References

- Dow, W.G., 1977. Kerogen studies and geological interpretations. *Journal of Geochemical Exploration*, no. 7, p. 77-99
- Husky-Bow Valley et al., 1985. Well history report Husky-Bow Valley et al. Archer K-19. Open File report, Department of Energy, Mines and Resources, Ottawa.

October 10, 1987



M.P. Avery  
Eastern Petroleum Geology

## MPA

- |                                     |                                       |
|-------------------------------------|---------------------------------------|
| c.c. K.D. McAlpine, EPGS, Dartmouth | J.S. Bell, ISPG, Calgary              |
| A.E. Jackson, EPGS, Dartmouth       | L.R. Snowdon, ISPG, Calgary           |
| EPGS Files, Dartmouth               | D. Skibo, ISPG, Calgary               |
| G.R. Campbell, COGLA, Ottawa        | C. Beaumont, Dalhousie Univ., Halifax |
| Central Technical Files, Ottawa     | D.F. Sherwin, CNOPB, St. Johns        |

Table II

**Summary of kerogen - based vitrinite reflectance**

Seq. #	Sample #	Depths in meters	Mean Ro (SD) non-rotated	Number of Readings	
				Total	Edited
1	K0656A	950-960	.33(±.04)	3	2
2	K0656C	1540-1550	.30(±.01)	5	2
3	K0657A	1930-1940	.40(±.06)	31	26
4	K0657B	2440-2480	.44(±.06)	28	23
5	K0657C	2680-2720	.45(±.08)	23	17
6	K0658A	2770-2810	.45(±.06)	40	33
7	K0658B	3010-3020	.51(±.07)	28	18
8	K0658C	3190-3230	.71(±.06)	26	4
9	K0659A	3400-3410	.70(±.04)	15	3
10	K0659B	3580-3590	.67(±.10)	11	6
11	K0659C	3910-3920	.73(±.05)	51	21
12	K0660A	4090-4100	.85(±.07)	21	12
13	K0660B	4240-4250	.89(±.09)	23	13

Note: All samples are kerogen concentrate type

Table III

Formation Tops (McAlpine, pers. comm.)\*

Formation	Depth
Banquereau	in casing
Paleocene U/C	1908m
S. Mara Unit	1908m
Base Tertiary U/C	1929m
Dawson Canyon	1929m
Petrel Mbr	1929-1970m
Eider	2016m
Albian U/C	2112m
Ben Nevis	2112m
Aptian U/C	2218m
Avalon	2218m
Barremian U/C	2343m
Catalina	2343m
'B' mkr	2427-2445m
Hibernia	2500m
Fortune Bay	2609
Jeanne d'Arc	3019m
Kimmeridgian U/C	3172m
Rankin	3172m
Egret Mbr	3340-3450m
T.D.	4299m

\* Preliminary stratigraphic picks.

Vitrinite Reflectance

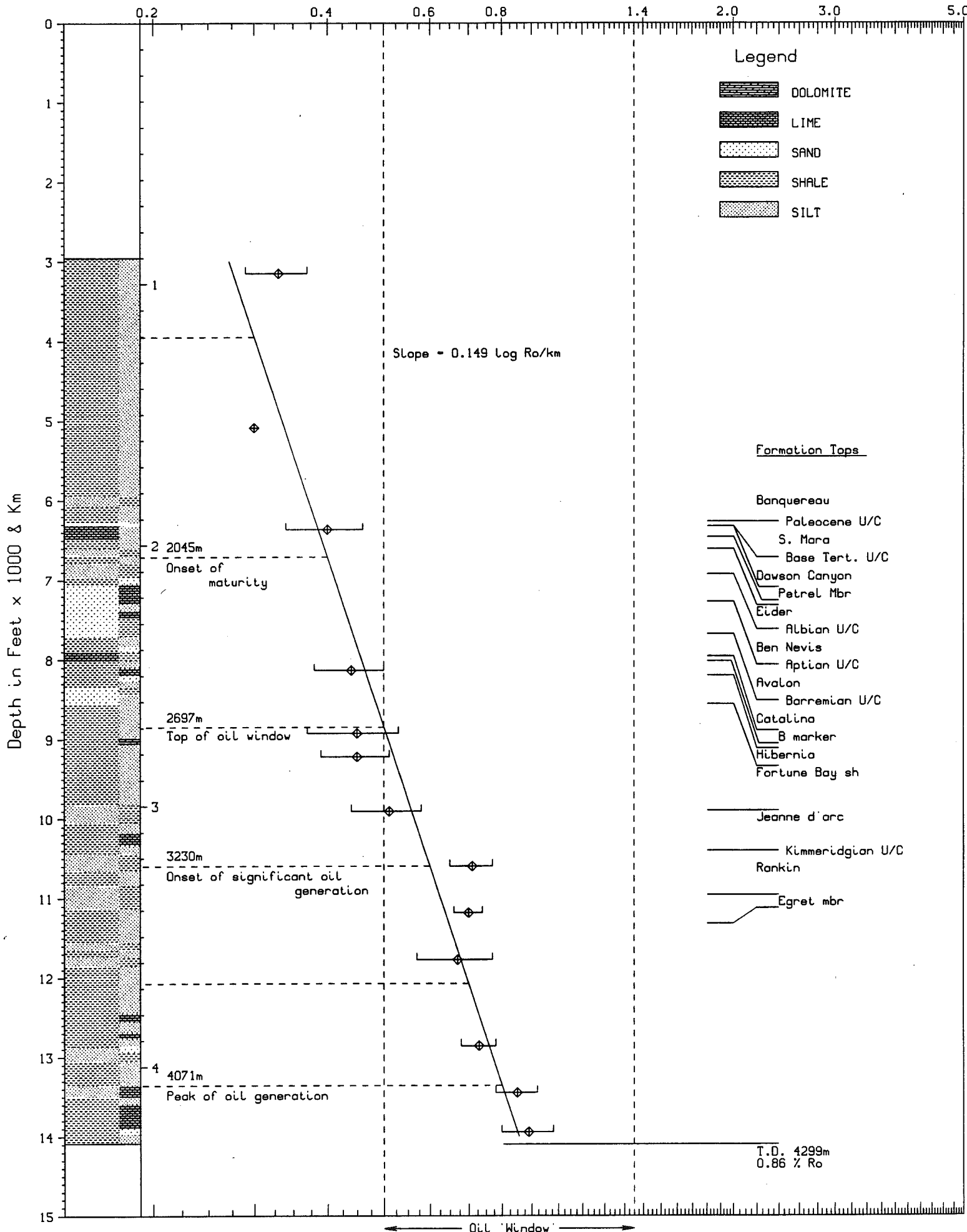


Fig. 1 Archer K-19

Vitrinite Reflectance

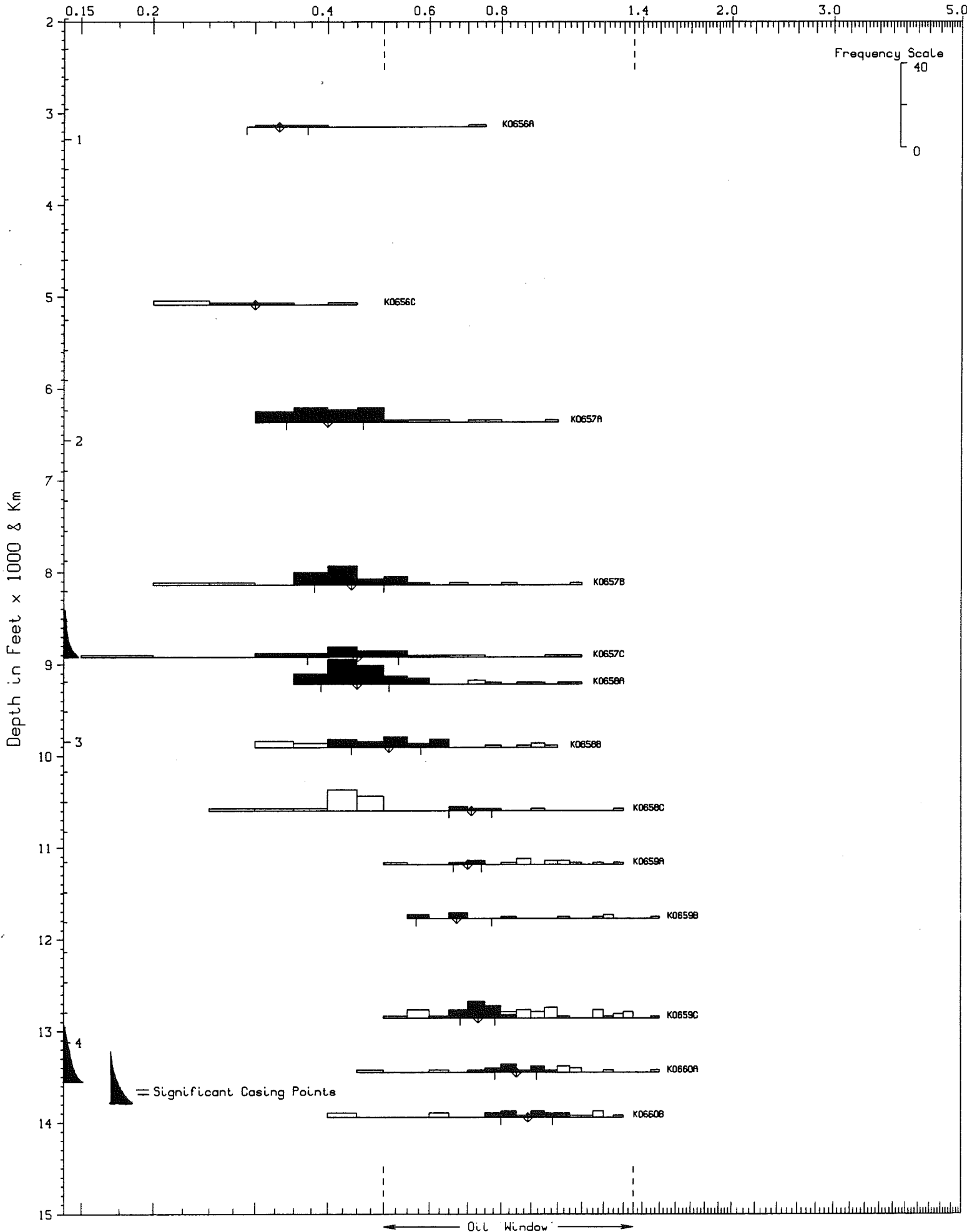


Fig. 2 Archer K-19 histograms

## APPENDIX I

### Sample Preparation Method

#### COGLA Lab preparation

Preliminary Wash

Samples dried in oven

Split: a. all of coarse to Petrology Lab

b.  $\frac{1}{2}$  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 250ml plastic beaker.

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

Washed (rinsed) 3 times.

Conc. HF overnight (removes silicates).

Washed (rinsed) 3 times.

Heated (60-65°C) conc. HCl (remove fluorides caused by HF).

Washed 3 times.

Then put into 15ml test tube with 4-5ml 4% Alconox.

Differential centrifuge at 1500rpm for 90 sec.

Decant.

Wash 3 times with centrifuging.

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

Centrifuge 1000rpm, 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.

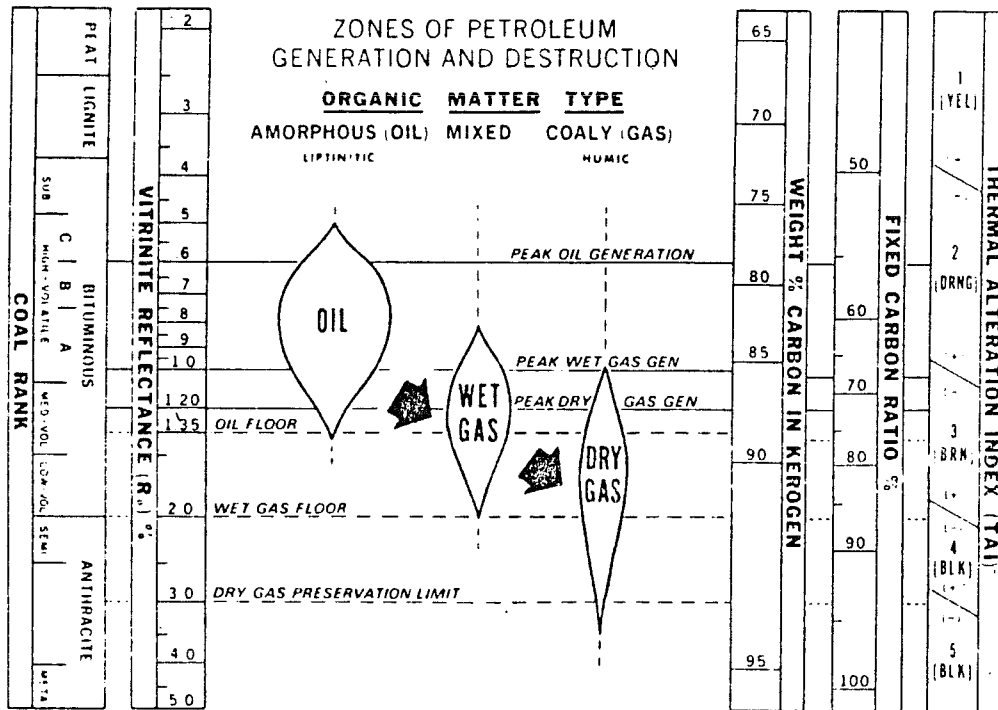
Mounted using epoxy resin (EPO-TEK 301) in predrilled plastic stubs.

Polished using modified coal petrology polishing methods.

Examined under oil lens at approximately 800x mag'n.



Appendix II (Dow,1977)



Note: For these reports, 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 now used as the 'peak of oil generation' (Table I, Figure 1).

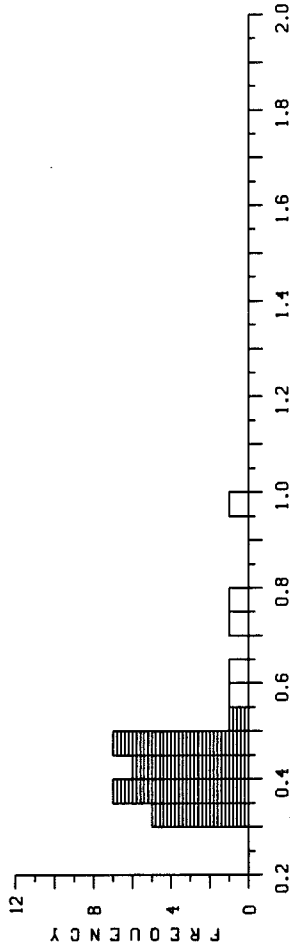
Appendix III  
Sample Reports

K0657A, ARCHER K-19, 1930-1940M

COL >	1	2	3	4	5	6	7	8	9	0
ROM	.30<	.30<	.32<	.34<	.34<	.35<	.35<	.36<	.38<	.38<
1	.39<	.39<	.40<	.41<	.41<	.42<	.42<	.43<	.45<	.45<
2	.45<	.46<	.46<	.47<	.48<	.52<	.57	.61	.70	.76
3	.99									

TOTAL	MEAN	STAND DEV	PTS	MIN	MAX	SUM
EDIT<	.45	.15	31	.30	.99	14.06
	.40	.06	26	.30	.52	10.43

REFLECTANCE HISTOGRAM

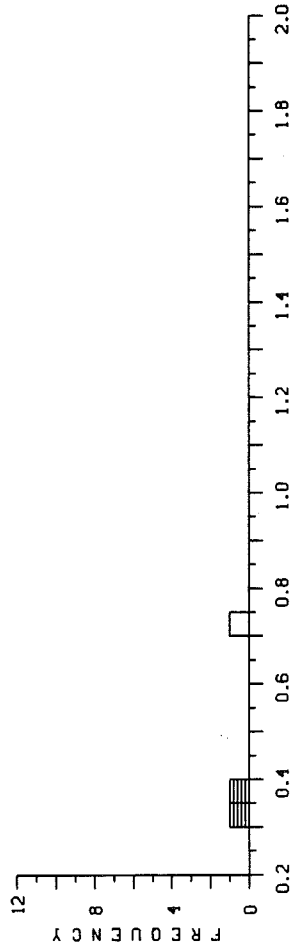


K0656A, ARCHER K-19, 950-960M

COL >	1	2	3	4	5	6	7	8	9	0
ROM	.30<	.35<	.72							

TOTAL	MEAN	STAND DEV	PTS	MIN	MAX	SUM
EDIT<	.46	.23	3	.30	.72	1.37
	.33	.04	2	.30	.35	.65

REFLECTANCE HISTOGRAM

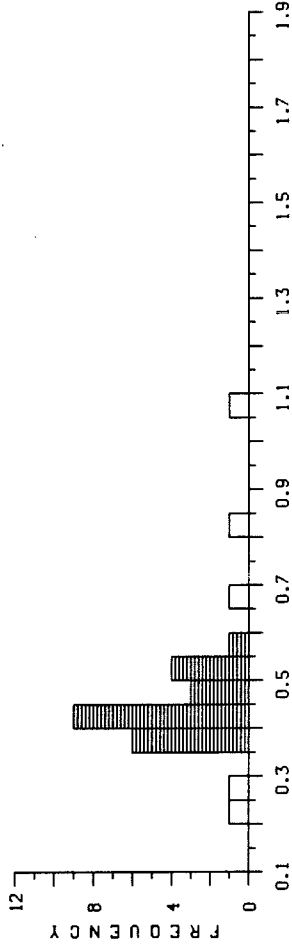


K0657B, ARCHER K-19, 2440-2480M

COL >	1	2	3	4	5	6	7	8	9	0
ROM	.24	.26	.35<	.36<	.37<	.37<	.39<	.39<	.40<	.40<
1	.40<	.43<	.43<	.43<	.44<	.44<	.44<	.46<	.47<	.49<
2	.50<	.51<	.52<	.52<	.56<	.65	.82	1.09		

TOTAL	MEAN	STAND DEV	PTS	MIN	MAX	SUM
EDIT<	.47	.16	28	.24	1.09	13.13
	.44	.06	23	.35	.56	10.07

REFLECTANCE HISTOGRAM

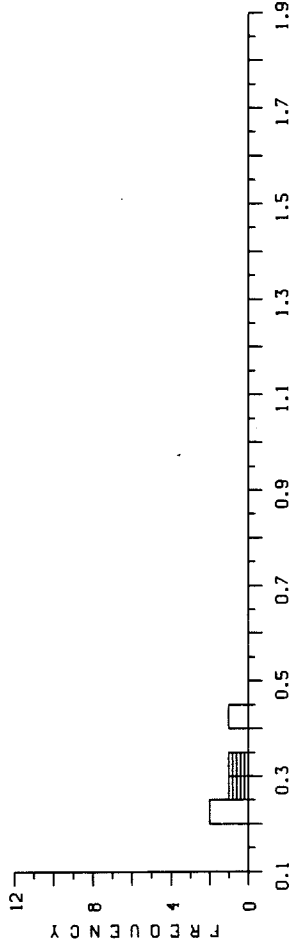


K0656C, ARCHER K-19, 1540-1550M

COL >	1	2	3	4	5	6	7	8	9	0
ROM	.20	.23	.29<	.30<	.43					

TOTAL	MEAN	STAND DEV	PTS	MIN	MAX	SUM
EDIT<	.29	.09	5	.20	.43	1.45
	.30	.01	2	.29	.30	.59

REFLECTANCE HISTOGRAM

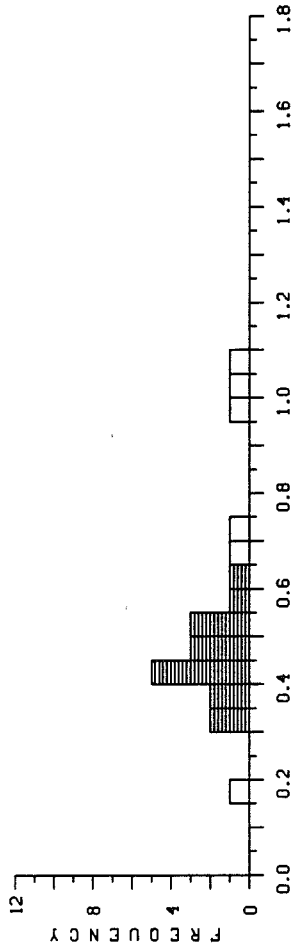


K0657C, ARCHER K-19, 2680-2720M

COL >	1	2	3	4	5	6	7	8	9	0
ROH	.17	.30	.34	.39	.39	.41	.41	.42	.42	.42
1	.45	.45	.49	.50	.51	.54	.58	.61	.67	.70
2	.95	1.01	1.06							

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.53	.22	23	.17	1.06	12.19
.45	.08	17	.30	.61	7.63

REFLECTANCE HISTOGRAM

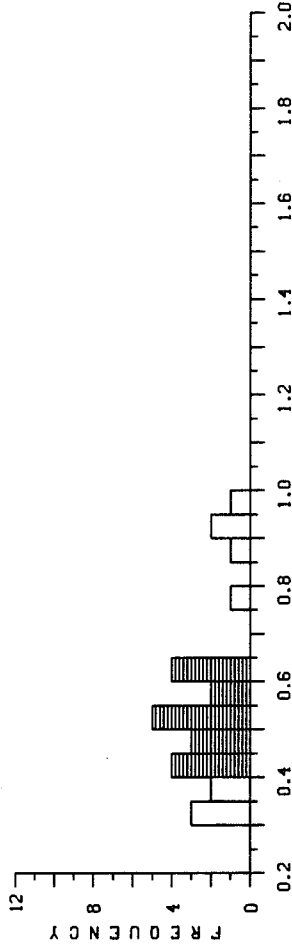


K0658B, ARCHER K-19, 3010-3020M

COL >	1	2	3	4	5	6	7	8	9	0
ROH	.32	.33	.34	.35	.37	.40	.41	.41	.42	.46
1	.46	.47	.50	.51	.51	.52	.54	.55	.56	.60
2	.60	.61	.62	.79	.89	.91	.94	.98		

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.55	.19	28	.32	.98	15.37
.51	.07	18	.40	.62	9.15

REFLECTANCE HISTOGRAM

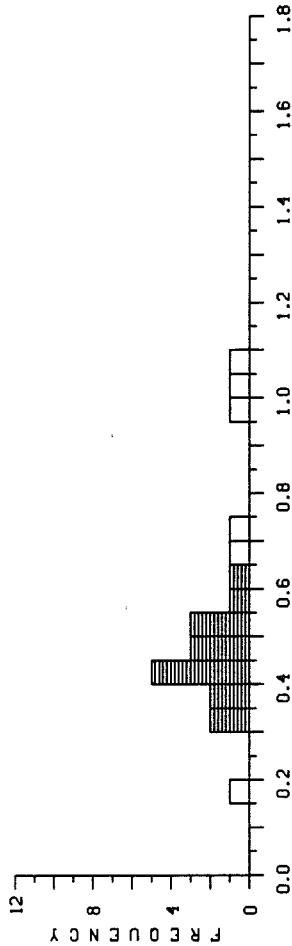


K0658A, ARCHER K-19, 2770-2810M

COL >	1	2	3	4	5	6	7	8	9	0
ROH	.38	.38	.38	.38	.39	.40	.40	.41	.41	.41
1	.42	.42	.42	.43	.43	.44	.44	.45	.45	.46
2	.46	.47	.47	.48	.49	.49	.50	.51	.54	.54
3	.56	.59	.59	.70	.71	.76	.85	.92	1.01	1.05

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.52	.17	40	.38	1.05	20.99
.45	.06	33	.38	.59	14.99

REFLECTANCE HISTOGRAM

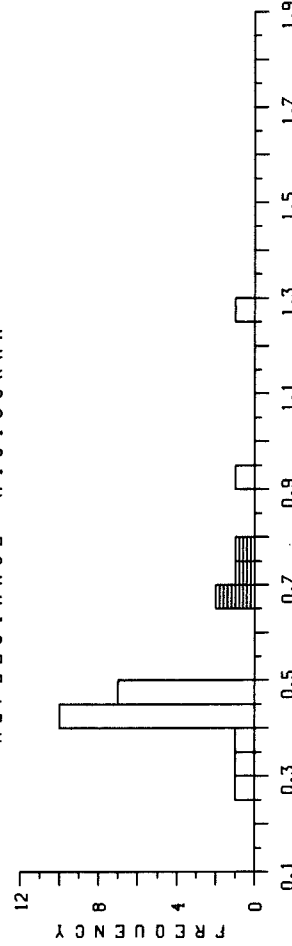


K0658C, ARCHER K-19, 3190-3230M

COL >	1	2	3	4	5	6	7	8	9	0
ROH	.27	.30	.36	.40	.40	.41	.42	.43	.43	.44
1	.44	.44	.44	.45	.46	.47	.48	.48	.49	.49
2	.65	.69	.73	.78	.94	1.28				

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.52	.22	26	.27	1.28	13.57
.71	.06	4	.65	.78	2.85

REFLECTANCE HISTOGRAM

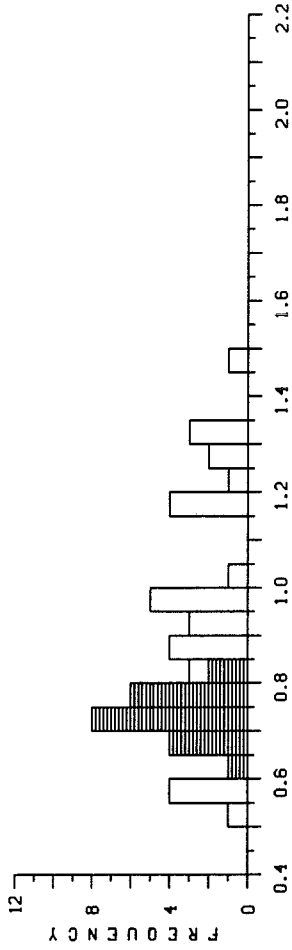


K0659C, ARCHER K-19, 3910-3920M

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.53	.57	.57	.58	.58	.63<	.65<	.67<	.68<	.68<
1	.70<	.71<	.71<	.72<	.72<	.73<	.73<	.74<	.75<	.75<
2	.75<	.77<	.77<	.79<	.80<	.80<	.83	.85	.86	.86
3	.87	.90	.92	.92	.97	.98	.98	.98	.99	1.03
4	1.16	1.16	1.18	1.19	1.21	1.25	1.26	1.31	1.33	1.34
5	1.47									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.68	.24	51	.53	1.47	44.88
EDIT<	.73	.05	21	.63	.80	15.25

REFLECTANCE HISTOGRAM

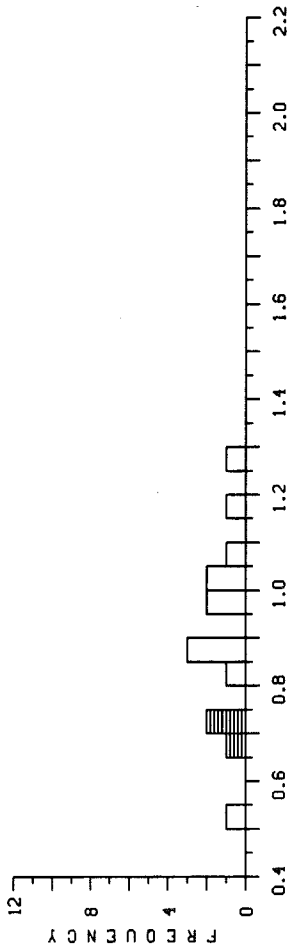


K0659A, ARCHER K-19, 3400-3410M

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.50	.65<	.72<	.73<	.82	.86	.88	.89	.95	.99
1	1.02	1.02	1.06	1.19	1.28					

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.90	.20	15	.50	1.28	13.56
EDIT<	.70	.04	3	.65	.73	2.10

REFLECTANCE HISTOGRAM

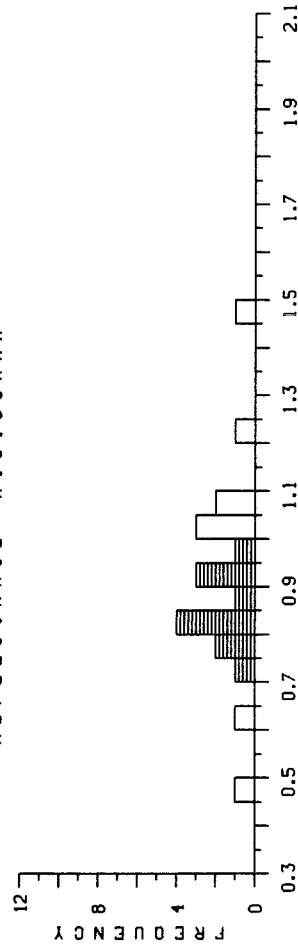


K0660A, ARCHER K-19, 4090-4100M

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.48	.63	.72<	.77<	.77<	.80<	.83<	.84<	.84<	.89<
1	.90<	.91<	.92<	.96<	1.00	1.02	1.02	1.07	1.09	1.22
2	1.46									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.91	.21	21	.48	1.46	19.14
EDIT<	.85	.07	12	.72	.96	10.15

REFLECTANCE HISTOGRAM

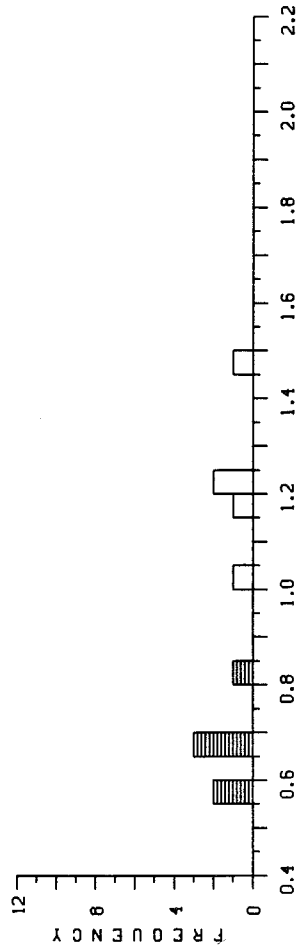


K0659B, ARCHER K-19, 3580-3590M

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.56<	.59<	.66<	.67<	.69<	.84<	1.00	1.18	1.23	1.24
1	1.47									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.92	.32	11	.56	1.47	10.13
EDIT<	.67	.10	6	.56	.84	4.01

REFLECTANCE HISTOGRAM



K06608, ARCHER K-19, 4240-4250M

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.42	.43	.62	.62	.76<	.77<	.80<	.80<	.81<	.86<
1	.90<	.93<	.94<	.95<	.98<	1.00<	1.04<	1.08	1.10	1.17
2	1.19	1.19	1.28							

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.90	.23	23	.42	1.28	20.64
EDIT<	.89	.09	13	.76	1.04	11.54

REFLECTANCE HISTOGRAM

