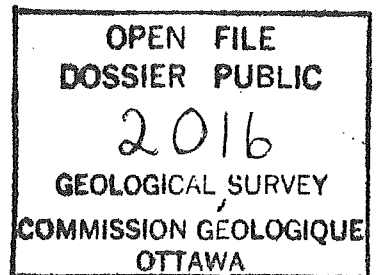


Report No. EPGs-DOM.2-88MPA

Vitrinite reflectance (Ro)  
of dispersed organics  
from  
Mobil-et al.  
South Mara C-13

Eastern Petroleum Geology Subdivision  
Atlantic Geoscience Centre, G.S.C., Dartmouth  
January 25, 1988



Vitrinite reflectance (Ro) of dispersed organics from Mobil et al.  
 South Mara C-13.

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G.S.C. Locality No.: D247                                      Location: 46°42'01.1"N, 48°32'19.6"W

R.T. Elevation: 25m                                      Water Depth: 98m                                      Total Depth: 5035m

Sample Interval: 790 - 5035.4m                                      Interval Studied: 950 - 4980m

Depth Units: Meters referenced to R.T.

Vitrinite reflectance has been determined on 19 rotary cuttings samples (Table II) from Mobil et al. South Mara C-13 which was classified as a wildcat well and is located on the Grand Banks approximately 300 km east-southeast of St. John's, Newfoundland. It was completed as an abandoned oil and gas discovery.

Data acquisition and manipulation for this report utilized the Zeiss Photomultiplier III Zonax system interfaced with a 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)-1689m	0.23 - 0.4	% Ro	immature
1689-2371m	0.4 - 0.5	% Ro	immature approaching maturity
2371-2929m	0.5 - 0.6	% Ro	marginally mature
2929m	0.6	% Ro	onset of significant oil generation
3809m	0.8	% Ro	peak of oil generation
4742m	1.0	% Ro	onset of significant wet gas generation
5035m T.D.	1.19	% Ro	within oil window
(5050m)	1.2	% Ro	onset of significant dry gas generation
(5410m)	1.35	% Ro	oil floor
(6613m)	2.0	% Ro	wet gas preservation limit

Note: ( ) indicate depth extrapolated at 0.142 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 for vitrinite reflectance analysis (Figure 1, Table II) was good over most of the section penetrated by Mara C-13 although the number of VR readings obtained was poor over the bottom 1000m (Table II, Figure 2). The data were plotted on a log Ro 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 0.142 log Ro/km.

Selection of the reflectance population which represented the true maturation of the sediments was significantly aided by the histogram display plot (Figure 2). This interpretation tool helps to reveal linear trends (populations) in the Ro 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 South Mara C-13 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
- Mobil et al., 1985. Well history report Mobil et al. South Mara C-13. OpenFile report, Department of Energy, Mines and Resources, Ottawa.

January 25, 1988

  
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Eastern Petroleum Geology  
MPA

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Central Technical Files, Ottawa	D.F. Sherwin, CNOBP, St. John's

Table II

Summary of kerogen - based vitrinite reflectance

Seq. #	Sample #	Depths in meters	Mean Ro (SD) non-rotated	Number of Readings	
				Total	Edited
1	K0649A	950-990	0.29(±.04)	35	27
2	K0649B	1220-1230	0.30(±.03)	12	12
3	K0649C	1520-1530	0.40(±.05)	44	42
4	K0650A	1670-1680	0.45(±.06)	40	40
5	K0650B	1790-1800	0.44(±.05)	14	12
6	K0650C	2000-2010	0.44(±.05)	11	8
7	K0651A	2120-2130	0.51(±.00)	10	1
8	K0651B	2300-2310	0.45(±.04)	6	2
9	K0651C	2530-2610	0.59(±.01)	33	2
10	K0652A	2805-2815	0.65(±.05)	29	17
11	K0652B	3105-3145	0.62(±.04)	53	23
12	K0652C	3255-3295	0.67(±.01)	24	3
13	K0653A	3525-3565	0.65(±.03)	17	5
14	K0653B	3800-3810	0.69(±.05)	24	5
15	K0653C	3920-3930	0.79(±.04)	7	3
16	K0654A	4100-4110	1.00(±.06)	4	2
17	K0654B	4250-4260	0.96(±.00)	3	1
18	K0655A	4880-4890	1.13(±.00)	5	1
19	K0655B	4970-4980	1.19(±.08)	10	6

Note: All samples are kerogen concentrate type.

Table III

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

Formation	Depth
Banquereau	in casing
South Mara unit	1840m
Dawson Canyon	1980m
Petrel Mbr	2186-2250m
Nautilus Shale	2258m
Ben Nevis	2682m
(Lower Ben Nevis)	2829m
Avalon	2958m
Eastern Shoals	3132m
"A" Marker	3226-3268m
White Rose Shale (upp	3268m
Catalina	3684m
"B" Marker	3923-3974m
Hibernia	3974m
Hebron Well Mbr	3974-4196m
Fortune Bay Shale	4609m
Jeanne d'Arc	4814m
T.D.	5035m

\* Preliminary stratigraphic picks.

Appendix III  
Sample Reports

Vitrinite Reflectance

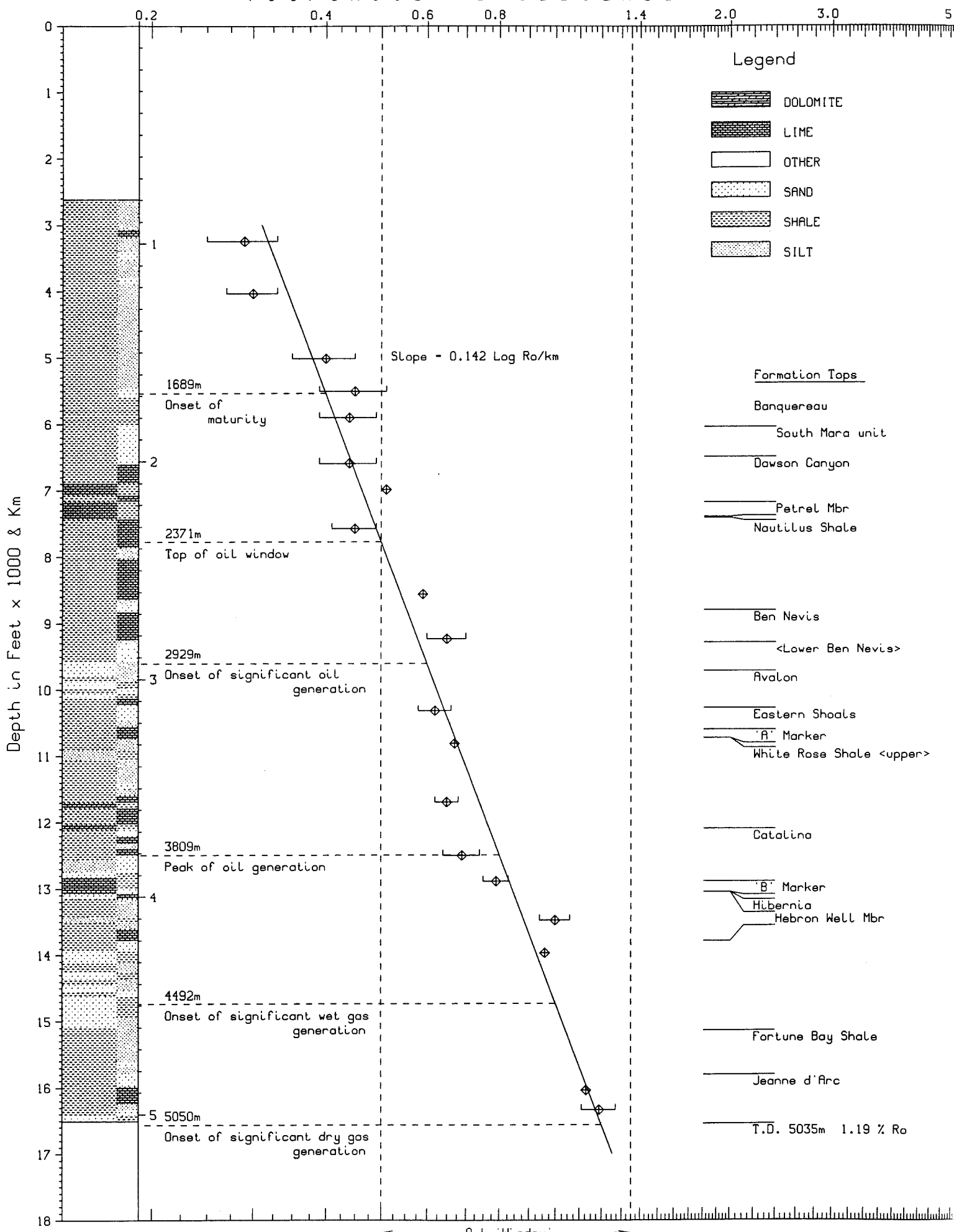


Fig. 1 South Mara C-13 < Maturation Profile >

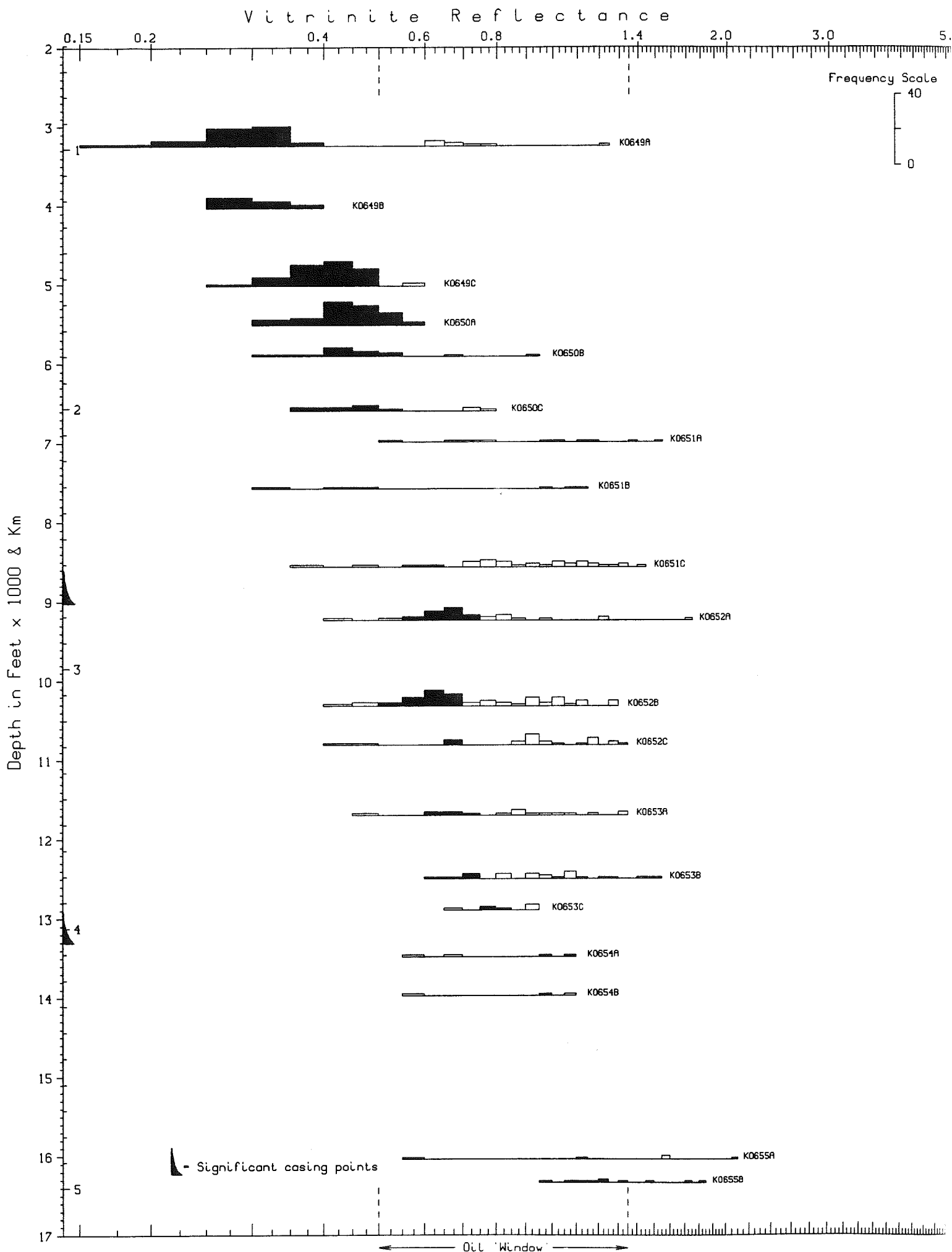


Fig. 2 South Mara C-13 < Histograms >



## 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 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.

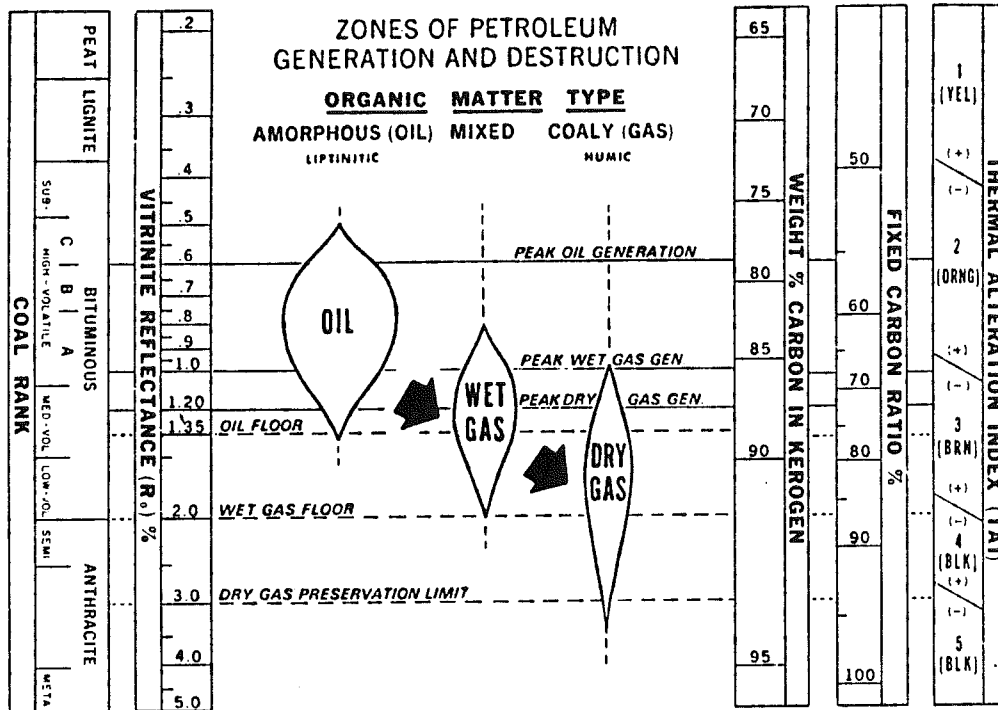
Freeze dried.

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)



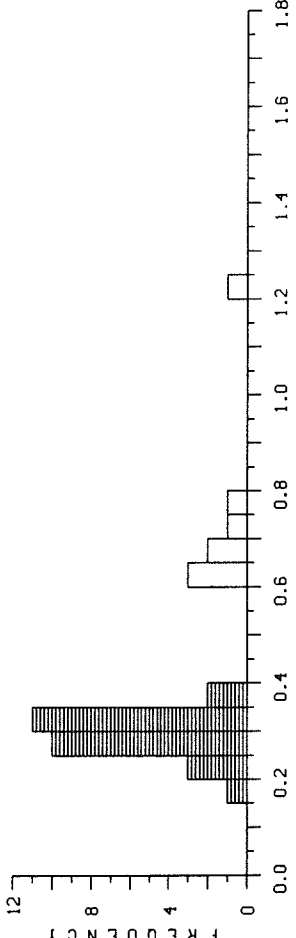
Note: In this report, the terminology used to describe the various maturation levels has been modified. The 'peak' designation, as used in this figure, has been changed to 'onset of significant' and 0.8 Ro is here used as the 'peak of oil generation' (Table I, Figure 1).

Appendix III  
Sample Reports

K0649A, 950-990M, SOUTH MARRA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.18<	.22<	.22<	.24<	.26<	.26<	.26<	.27<	.27<	.27<
1	.28<	.28<	.29<	.29<	.30<	.30<	.31<	.31<	.31<	.32<
2	.32<	.33<	.34<	.34<	.36<	.36<	.36<	.64		
3	.68	.69	.72	.78	1.21					

REFLECTANCE HISTOGRAM

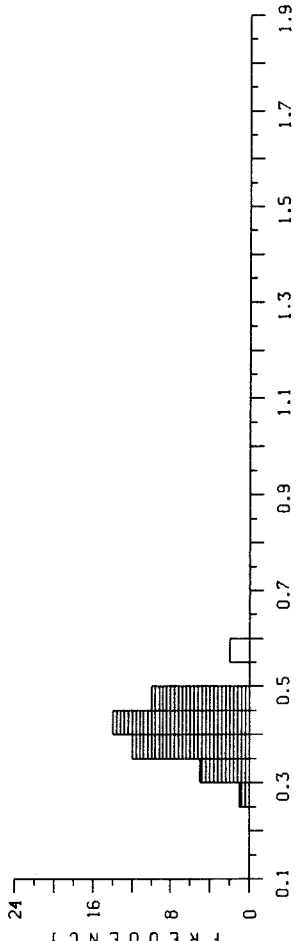


MEAN	STAND DEV	PTS	MIN	MAX	SUM
.39	.22	35	.18	1.21	13.81
TOTAL EDIT<	.29	.04	.18	.36	7.83

K0649C, 1520-1530M, SOUTH MARRA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.28<	.33<	.34<	.34<	.34<	.34<	.35<	.36<	.37<	.37<
1	.37<	.37<	.37<	.38<	.38<	.38<	.39<	.39<	.40<	.40<
2	.40<	.40<	.41<	.41<	.41<	.41<	.42<	.42<	.42<	.43<
3	.44<	.44<	.45<	.45<	.45<	.45<	.46<	.46<	.46<	.47<
4	.48<	.49<	.56	.57						

REFLECTANCE HISTOGRAM

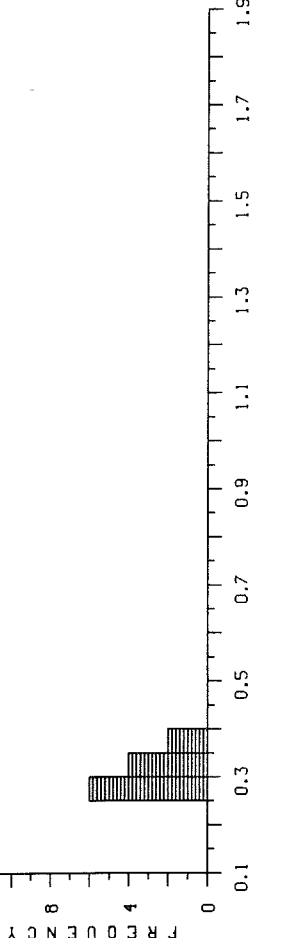


MEAN	STAND DEV	PTS	MIN	MAX	SUM
.41	.06	44	.28	.57	18.01
TOTAL EDIT<	.40	.05	.28	.49	16.88

K0649B, 1220-1230M, SOUTH MARRA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.25<	.28<	.28<	.28<	.29<	.29<	.30<	.30<	.33<	.34<
1	.36<	.36<								

REFLECTANCE HISTOGRAM

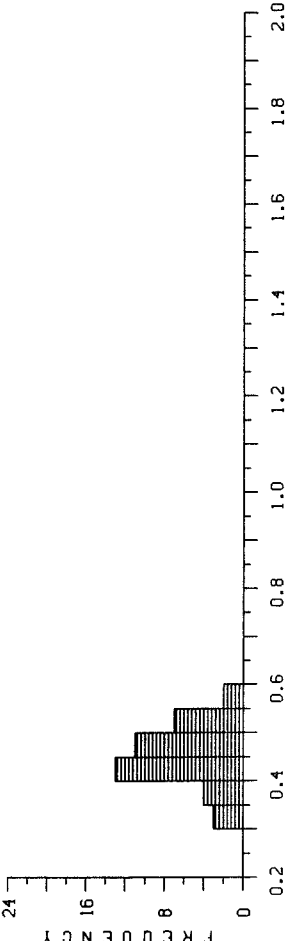


MEAN	STAND DEV	PTS	MIN	MAX	SUM
.31	.03	12	.25	.36	3.66
TOTAL EDIT<	.31	.03	.25	.36	3.66

K0650P, 1670-1680M, SOUTH MARRA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.31<	.33<	.33<	.35<	.39<	.39<	.39<	.40<	.40<	.40<
1	.41<	.42<	.42<	.43<	.43<	.44<	.44<	.44<	.44<	.44<
2	.45<	.45<	.45<	.46<	.46<	.47<	.47<	.48<	.49<	.49<
3	.49<	.50<	.50<	.51<	.51<	.51<	.51<	.53<	.56<	.56<

REFLECTANCE HISTOGRAM



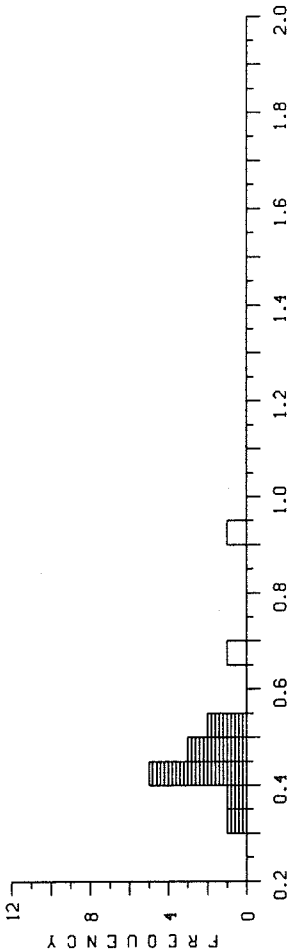
MEAN	STAND DEV	PTS	MIN	MAX	SUM
.45	.06	40	.31	.56	17.88
TOTAL EDIT<	.45	.06	.31	.56	17.88

K0650B,1790-1800M,SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.34<	.39<	.41<	.42<	.43<	.43<	.43<	.45<	.47<	.48<
1	.50<	.51<	.66	.91						

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.49	.14	14	.34	.91	6.83
.44	.05	12	.34	.51	5.26

REFLECTANCE HISTOGRAM

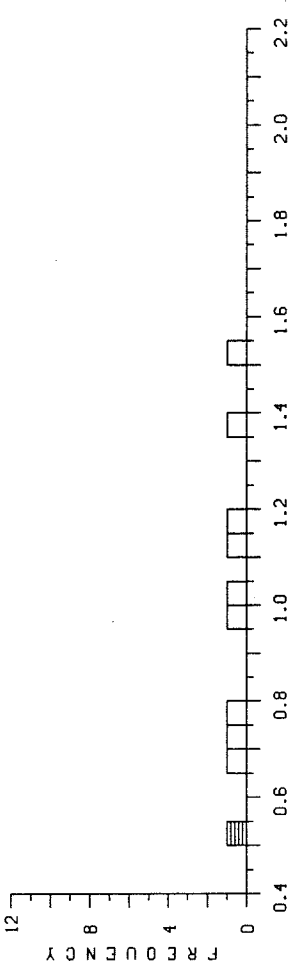


K0651A,2120-2130M,SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.51<	.68	.73	.75	.98	1.01	1.14	1.19	1.38	1.53

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.99	.33	10	.51	1.53	9.90
.51	.00	1	.51	.51	.51

REFLECTANCE HISTOGRAM

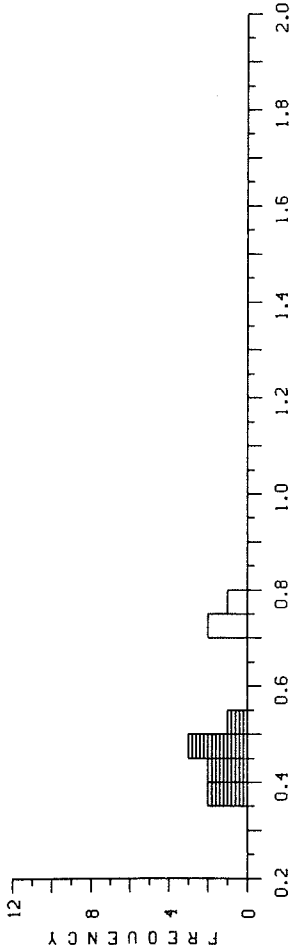


K0650C,2000-2010M,SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.36<	.39<	.43<	.43<	.45<	.46<	.49<	.52<	.71	.73
1	.79									

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.52	.15	11	.36	.79	5.76
.44	.05	8	.36	.52	3.53

REFLECTANCE HISTOGRAM

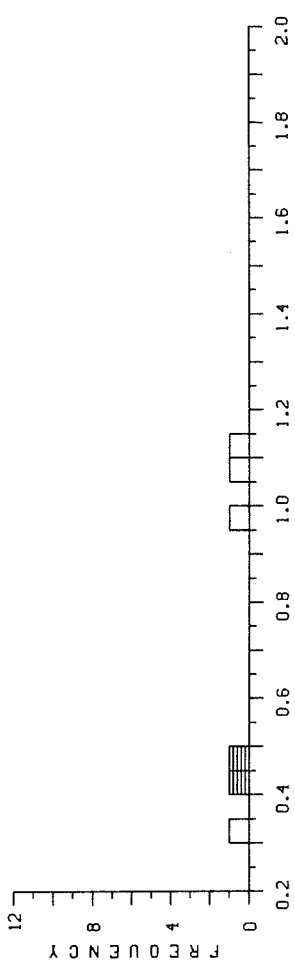


K0651B,2300-2310M,SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.32	.43<	.48<	.96	1.09	1.10				

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.73	.36	6	.32	1.10	4.38
.46	.04	2	.43	.48	.91

REFLECTANCE HISTOGRAM

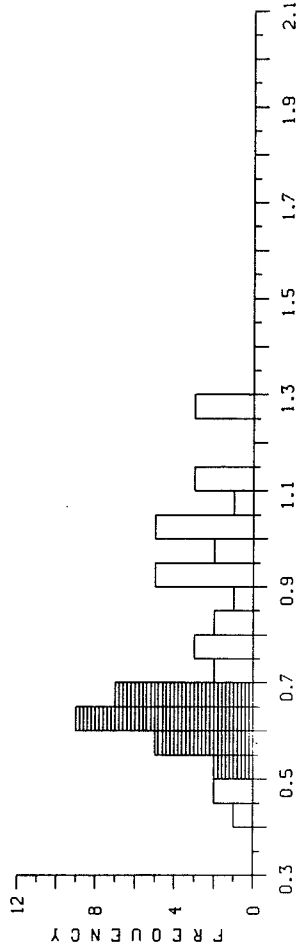


K0652B, 3105-3145M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.43	.47	.48	.53	.54	.55	.56	.57	.58	.59
1	.61	.62	.62	.62	.63	.63	.64	.64	.64	.65
2	.66	.66	.66	.67	.67	.68	.68	.73	.74	.76
3	.78	.80	.84	.85	.90	.91	.91	.91	.91	.94
4	.98	1.00	1.01	1.01	1.03	1.03	1.09	1.10	1.12	1.13
5	1.25	1.28	1.29							

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.79	.22	53	.43	1.29	41.69
EDIT<	.62	.04	23	.53	.68	14.22

REFLECTANCE HISTOGRAM

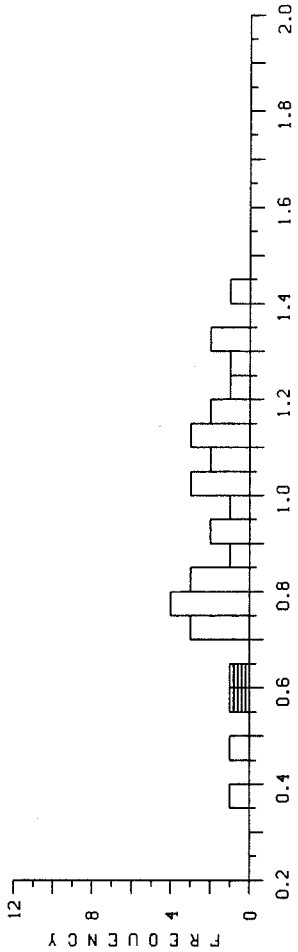


K0651C, 2530-2610M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.36	.49	.58	.60	.71	.73	.74	.75	.76	.76
1	.78	.83	.83	.83	.87	.90	.92	.96	1.00	1.02
2	1.03	1.06	1.08	1.10	1.11	1.12	1.17	1.18	1.20	1.27
3	1.30	1.30	1.41							

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.93	.25	33	.36	1.41	30.75
EDIT<	.59	.01	2	.58	.60	1.18

REFLECTANCE HISTOGRAM

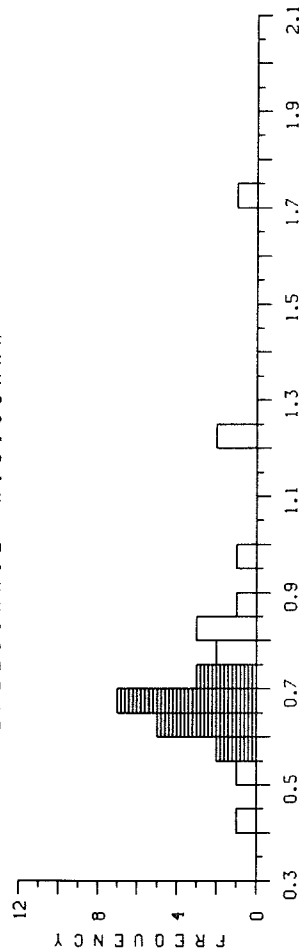


K0652A, 2805-2815M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.42	.53	.58	.58	.60	.60	.63	.63	.64	.66
1	.66	.66	.67	.67	.68	.69	.71	.72	.72	.78
2	.79	.82	.83	.84	.88	.95	1.21	1.24	1.72	

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.76	.25	29	.42	1.72	22.11
EDIT<	.65	.05	17	.58	.72	11.10

REFLECTANCE HISTOGRAM

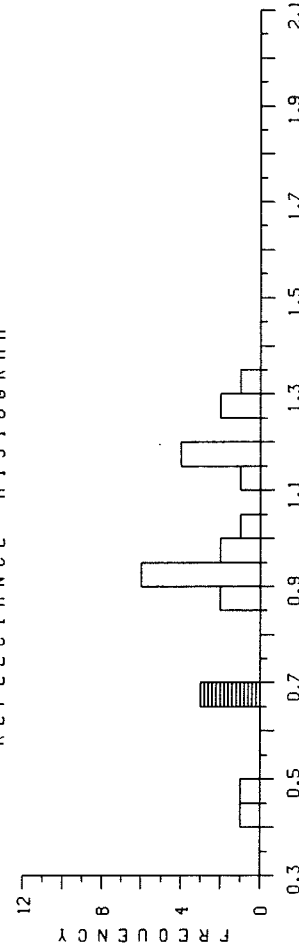


K0652C, 3255-3295M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.43	.47	.66	.68	.68	.85	.88	.91	.91	.92
1	.92	.92	.94	.96	.96	1.01	1.12	1.16	1.17	1.18
2	1.19	1.26	1.27	1.33						

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.95	.24	24	.43	1.33	22.78
EDIT<	.67	.01	3	.66	.68	2.02

REFLECTANCE HISTOGRAM

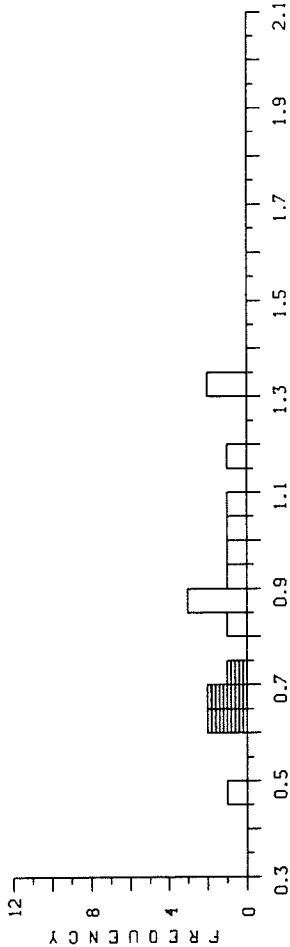


K06539, 3525-3565M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.48	.61<	.63<	.65<	.66<	.70<	.82	.85	.87	.88
ROW	.94	.99	1.01	1.07	1.18	1.33	1.33			

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.88	.25	17	.48	1.33	15.00
EDIT<	.65	.03	.61	.70	3.25

REFLECTANCE HISTOGRAM

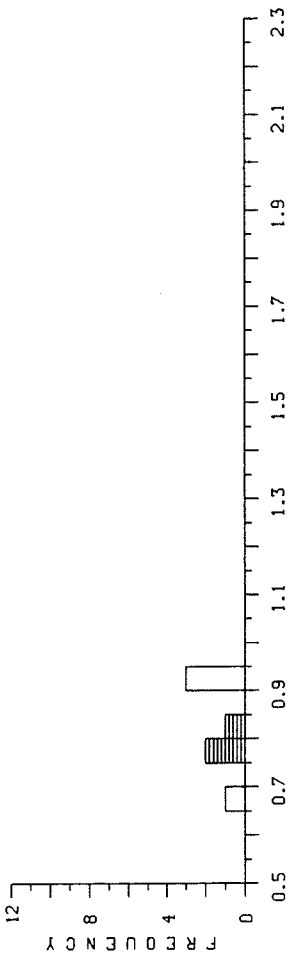


K0653C, 3920-3930M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.65	.76<	.78<	.84<	.91	.92	.93			

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.83	.10	7	.65	.93	5.79
EDIT<	.79	.04	.76	.84	2.38

REFLECTANCE HISTOGRAM

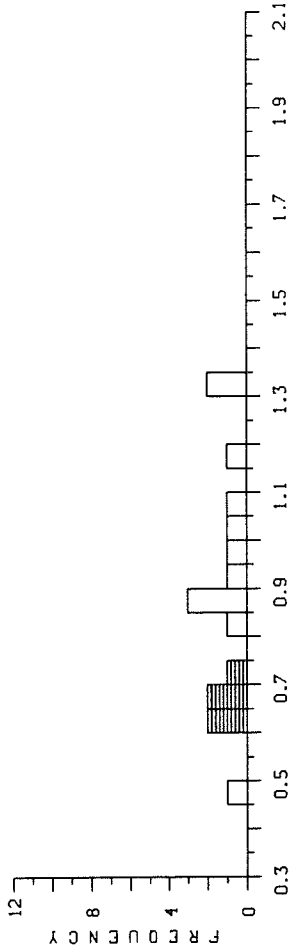


K0653B, 3600-3810M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.60<	.68<	.72<	.72<	.72<	.81	.82	.82	.91	.92
ROW	.93	.96	.98	1.02	1.05	1.07	1.08	1.14	1.22	
ROW	1.27	1.40	1.46	1.53						

MEAN	STAND DEV	PTS	MIN	MAX	SUM
1.00	.25	24	.60	1.53	23.88
EDIT<	.69	.05	.60	.72	3.44

REFLECTANCE HISTOGRAM

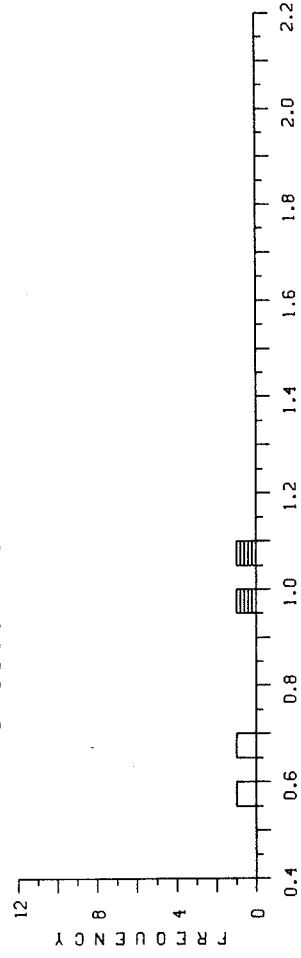


K0654A, 4100-4110M, SOUTH MARA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.57	.68	.96<	1.05<						

MEAN	STAND DEV	PTS	MIN	MAX	SUM
.82	.23	4	.57	1.05	3.26
EDIT<	1.01	.06	.96	1.05	2.01

REFLECTANCE HISTOGRAM

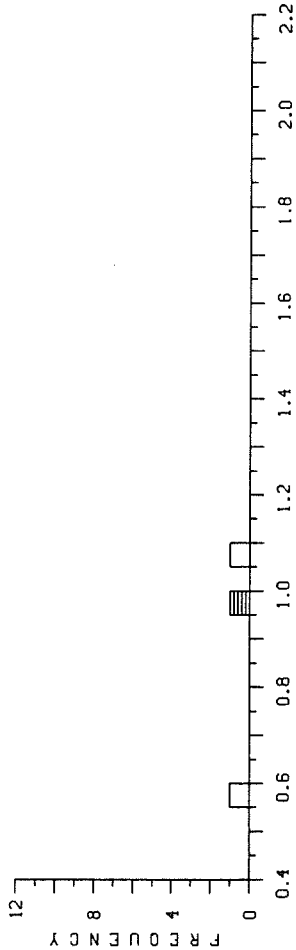


K0654B, 4250-4260M, SOUTH MARRA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.57	.96<	1.05							

MEAN	.86	STAND DEV	.26	PTS	3	MIN	.57	MAX	1.05	SUM	2.58
TOTAL	.96	.00	1	.96	.96						
EDIT<											

REFLECTANCE HISTOGRAM

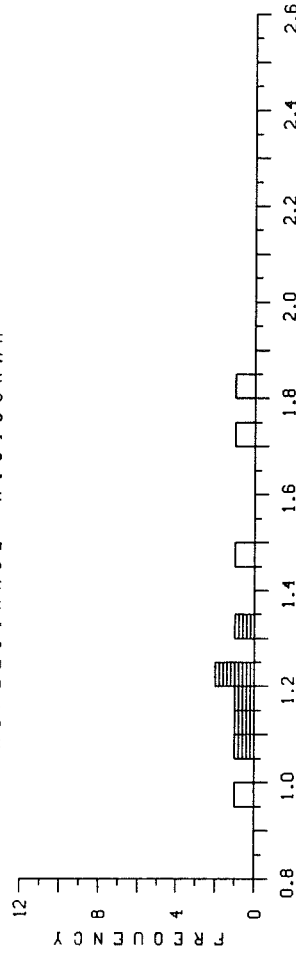


K0655B, 4970-4980M, SOUTH MARRA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.97	1.09<	1.12<	1.16<	1.21<	1.22<	1.32<	1.45	1.71	1.83

MEAN	1.31	STAND DEV	.28	PTS	10	MIN	.97	MAX	1.83	SUM	13.06
TOTAL	1.19	.08	6	1.09	1.32						
EDIT<											

REFLECTANCE HISTOGRAM



K0655A, 4880-4890M, SOUTH MARRA C-13

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.58	1.13<	1.59	1.59	2.05					

MEAN	1.39	STAND DEV	.56	PTS	5	MIN	.58	MAX	2.05	SUM	6.94
TOTAL	1.13	.00	1	1.13	1.13						
EDIT<											

REFLECTANCE HISTOGRAM

