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Vitrinite reflectance (Ro) of dispersed organics from Shell PetroCan et al. **Uniacke G-72**

Report No. EPGS-DOM.2-89MPA

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January 10, 1989

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G.S.C. Locality No.: D228 **Location:** 44°11'29.17"N, 59°41'09.75"W

R.T. Elevation: 24m **Water Depth:** 153m **Total Depth:** 5735m

Sample Interval: 610 - 5735m **Interval Studied:** 955 - 5710m

Depth Units: Meters referenced to R.T.

Vitrinite reflectance has been determined on 23 rotary cuttings samples (Table II) from Shell PetroCan et al. Uniacke G-72 which was classified as a wildcat well and is located on the Scotian Shelf approximately 310 km east of Halifax, Nova Scotia. The well was plugged and abandoned as a gas discovery.

Data acquisition and manipulation for this report utilized the Zeiss Photo-multiplier III Zonax system interfaced with a PC AT microcomputer which provides reliable data acquisition and fast statistical summaries.

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)-1918m	0.21 - 0.4	% Ro	immature
1918-2595m	0.4 - 0.5	% Ro	immature approaching maturity
2595-3147m	0.5 - 0.6	% Ro	marginally mature
3147m	0.6	% Ro	onset of significant oil generation
4020m	0.8	% Ro	peak of oil generation
4696m	1.0	% Ro	onset of significant wet gas generation
5249m	1.2	% Ro	onset of significant dry gas generation
5606m	1.35	% Ro	oil floor
5735m T.D.	1.41	% Ro	beyond oil preservation limit
6797m	(2.0)	% Ro	wet gas preservation limit
8026m	(3.0)	% Ro	dry gas preservation limit

Note: ( ) indicate Ro extrapolated at 0.143 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 analysis (Figure 1, Table II) was good over the section penetrated by Uniacke G-72. The data are plotted on a log Ro vs. linear depth scale and a linear regression line was calculated by the least squares method (Figure 1). The 'error bars' plotted 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 0.143 log Ro/km.

Selection of the reflectance population which represented the true maturation of the sediments was aided significantly 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 Uniacke G-72 (between 2595 and 5606m) 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

January 10, 1989

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Table II

Summary of kerogen - based vitrinite reflectance

Seq. #	Sample #	Depths in meters	Mean Ro (SD) non-rotated	Number of Readings Total	Edited
1	K0681A	955-965	0.25(±.03)	11	8
2	K0682A	1255-1265	0.37(±.06)	17	14
3	K0682C	1435-1445	0.38(±.04)	22	21
4	K0683B	1645-1655	0.41(±.05)	32	19
5	K0684B	1940-1950	0.43(±.06)	29	23
6	K0685A	2130-2140	0.48(±.07)	40	29
7	K0685C	2335-2345	0.47(±.04)	25	18
8	K0686B	2495-2505	0.53(±.06)	11	3
9	K0687A	2780-2790	0.53(±.07)	31	19
10	K0688A	3050-3060	0.54(±.06)	13	11
11	K0688C	3290-3300	0.59(±.05)	21	14
12	K0689B	3530-3540	0.56(±.04)	33	30
13	K0690A	3800-3810	0.64(±.05)	35	32
14	K0690C	4010-4020	0.68(±.07)	28	24
15	K0691B	4280-4290	0.77(±.10)	31	20
16	K0692A	4400-4410	0.74(±.09)	42	31
17	K0692C	4615-4625	0.94(±.12)	25	15
18	K0693B	4795-4805	1.09(±.11)	24	20
19	K0694A	4985-4995	1.17(±.18)	14	13
20	K0694C	5165-5175	1.21(±.12)	14	10
21	K0695B	5365-5375	1.22(±.07)	35	19
22	K0696A	5580-5590	1.70(±.13)	12	11
23	K0696C	5700-5710	1.72(±.14)	22	16

Note: All samples are kerogen concentrate type.

Table III

Formation Tops (Wade, pers. comm.)

Formation	Depth
Banquereau	in casing
Wyandot	1126m
Dawson Canyon	1219m
Petrel Mbr	1318-1326m
Logan Canyon	1411m
Marmora Mbr	1411m
Sable Mbr	1675m
Cree Mbr	1761m
Naskapi Mbr	2453m
Missisauga	2563m
upper mbr	2563m
"O" Marker	2907-2948m
middle mbr	2948m
Top OP approx	3975m
Mic Mac	4011m
T.D.	5735m

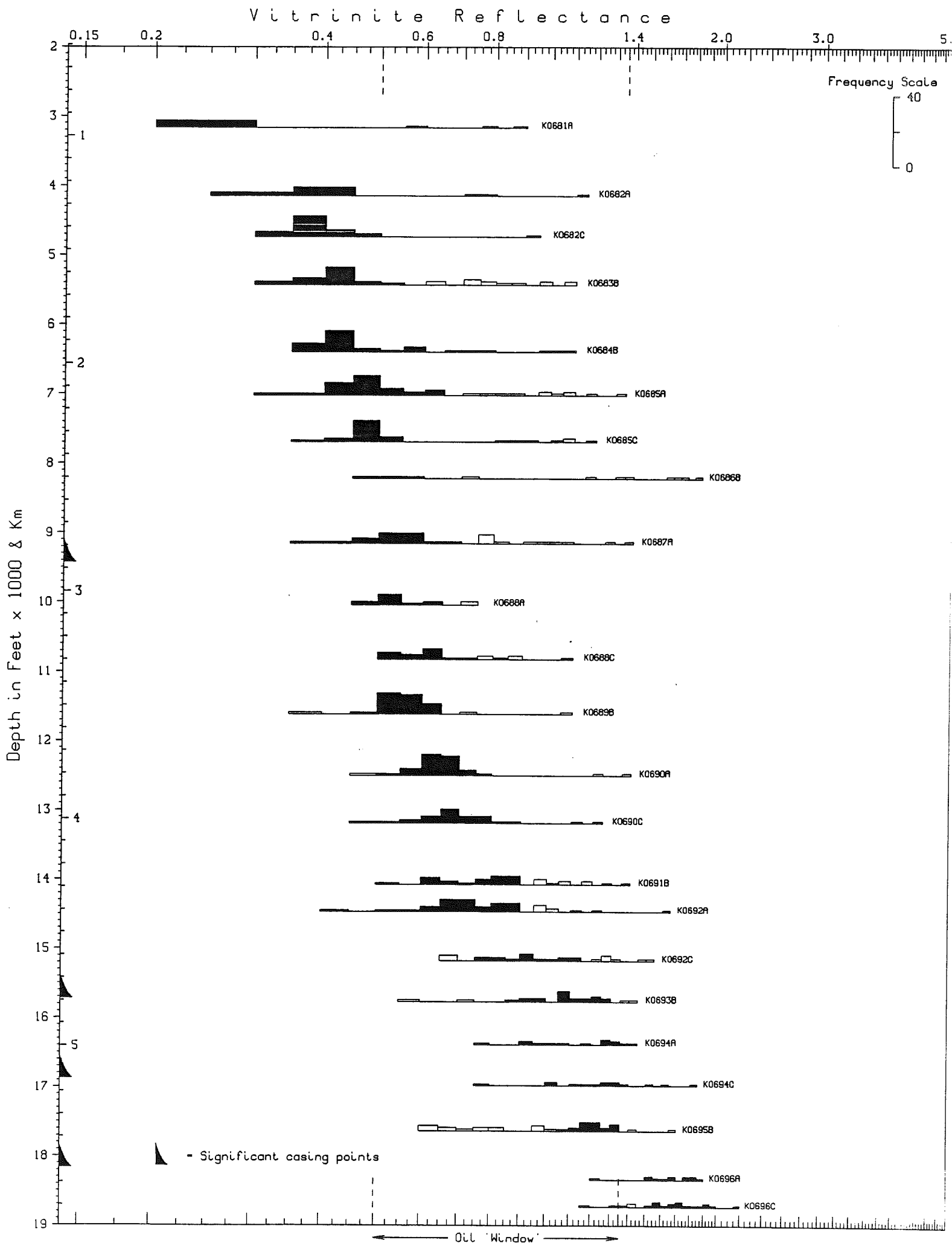


Fig. 2 Uniacke G-72 < Histograms >

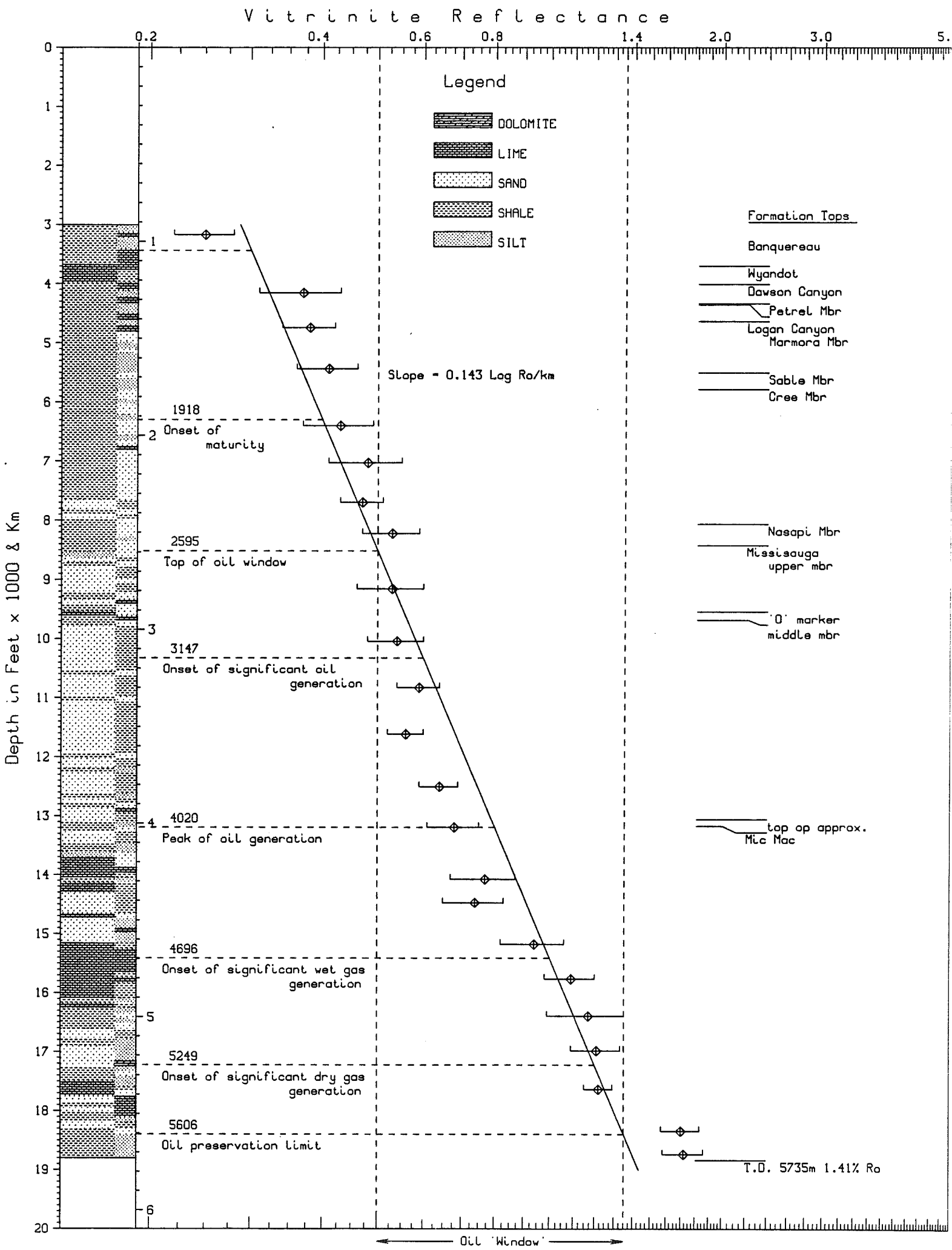


Fig. 1 Uniacke G-72

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:

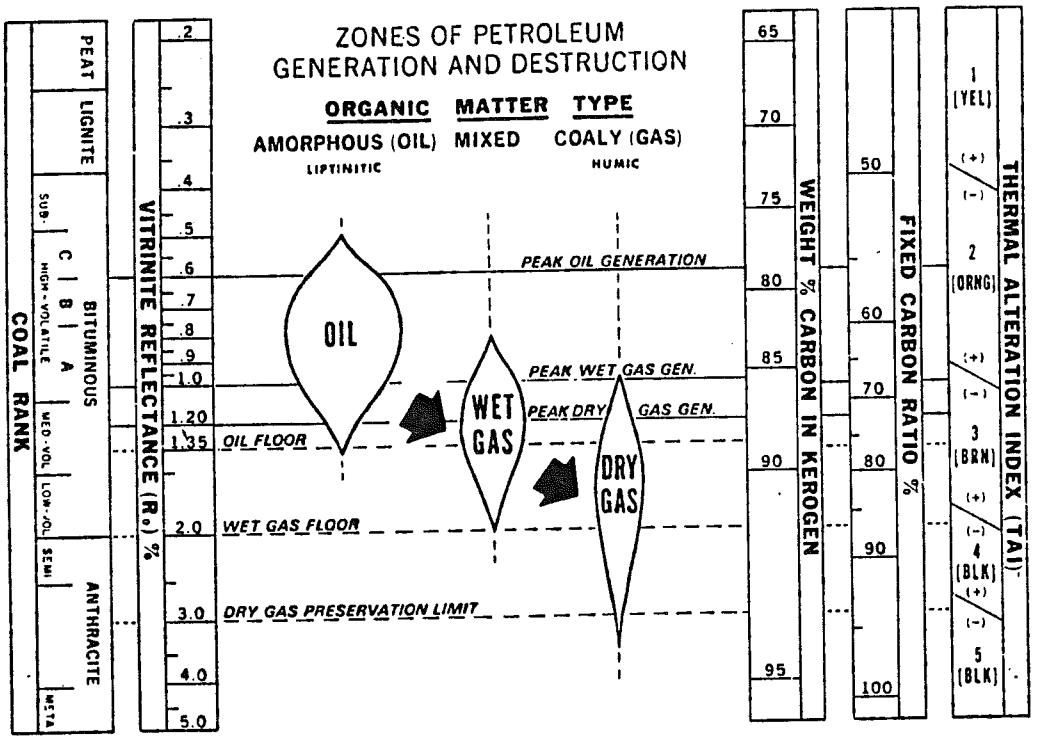
PALYNOLOGY Lab preparation

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' (Table I, Figure 1).

Appendix III

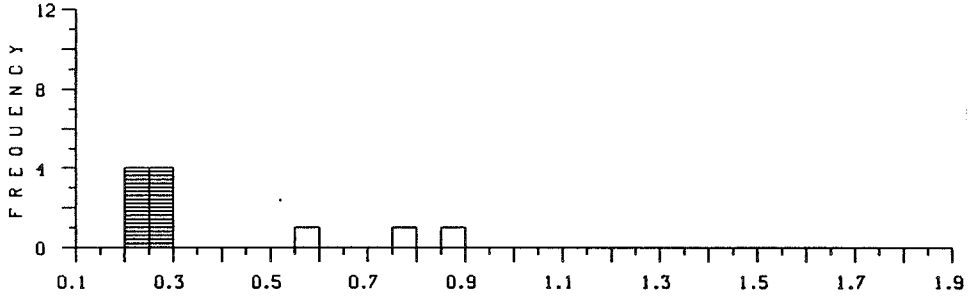
Sample Reports

K0681A,955-965M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.21<	.21<	.24<	.24<	.26<	.27<	.27<	.28<	.56	.75
1	.85									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.38	.23	11	.21	.85	4.14
EDIT<	.25	.03	8	.21	.28	1.98

REFLECTANCE HISTOGRAM

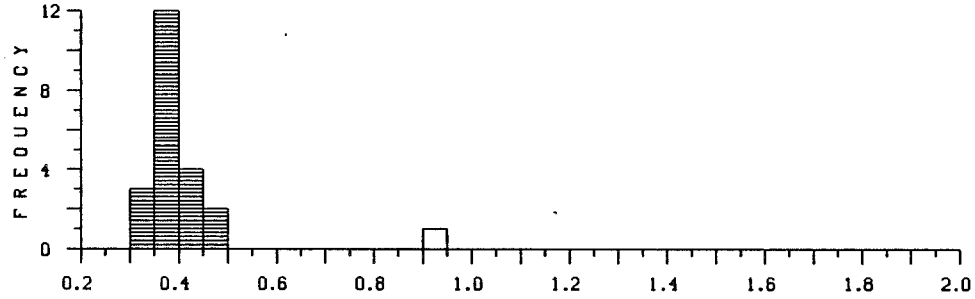


K0682C,1435-1445M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.31<	.33<	.33<	.35<	.36<	.37<	.37<	.38<	.38<	.38<
1	.38<	.39<	.39<	.39<	.39<	.40<	.40<	.42<	.43<	.46<
2	.46<	.92								

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.41	.12	22	.31	.92	8.99
EDIT<	.38	.04	21	.31	.46	8.07

REFLECTANCE HISTOGRAM

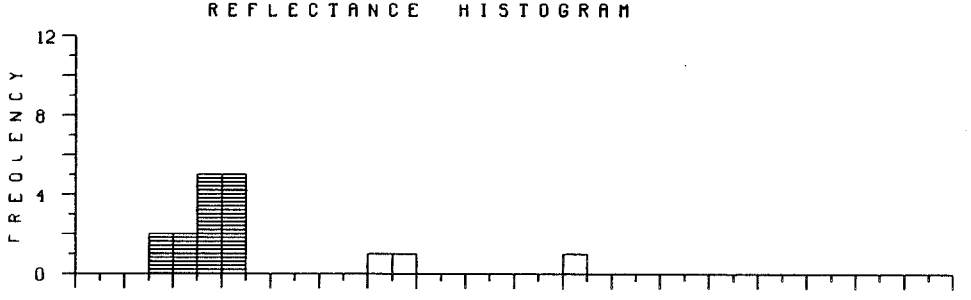


K0682A,1255-1265M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.25<	.29<	.32<	.32<	.35<	.35<	.37<	.37<	.38<	.40<
1	.42<	.43<	.44<	.44<	.73	.77	1.13			

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.46	.22	17	.25	1.13	7.76
EDIT<	.37	.06	14	.25	.44	5.13

REFLECTANCE HISTOGRAM

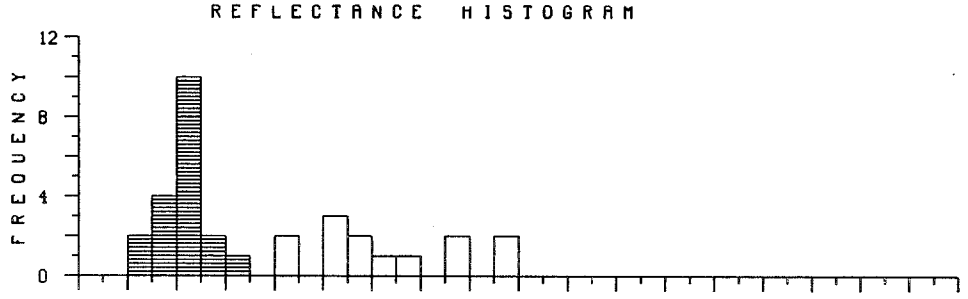


K0683B,1645-1655M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.30<	.33<	.37<	.38<	.39<	.39<	.40<	.41<	.41<	.41<
1	.42<	.42<	.42<	.42<	.43<	.44<	.45<	.49<	.53<	.60
2	.64	.70	.72	.74	.75	.79	.82	.85	.95	.97
3	1.05	1.08								

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.58	.23	32	.30	1.08	18.47
EDIT<	.41	.05	19	.30	.53	7.81

REFLECTANCE HISTOGRAM

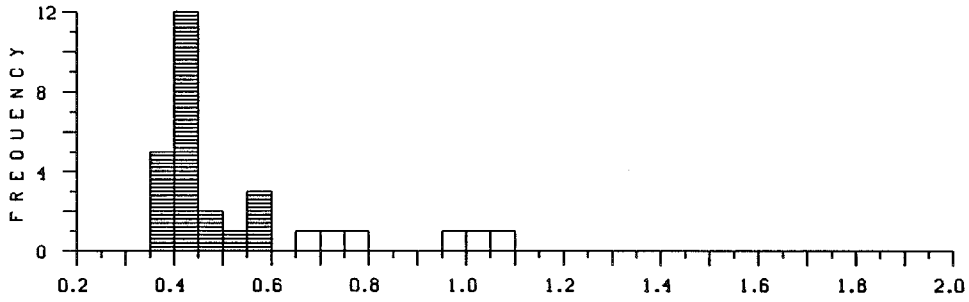


K0684B,1940-1950M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.35<	.38<	.38<	.39<	.39<	.40<	.40<	.40<	.41<	.41<
1	.41<	.42<	.42<	.42<	.42<	.44<	.44<	.46<	.46<	.50<
2	.56<	.56<	.58<	.69	.70	.76	.99	1.03	1.07	

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.53	.20	29	.35	1.07	15.24
EDIT<	.43	.06	23	.35	.58	10.00

REFLECTANCE HISTOGRAM

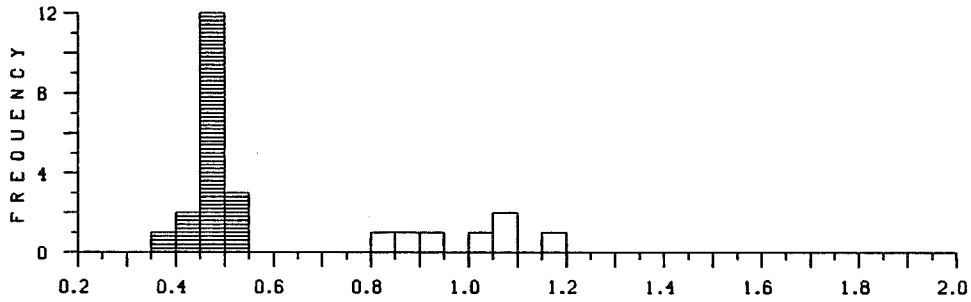


K0685C,2335-2345M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.37<	.43<	.44<	.45<	.46<	.46<	.46<	.47<	.47<	.48<
1	.48<	.48<	.48<	.49<	.49<	.51<	.52<	.52<	.83	.89
2	.93	1.03	1.06	1.07	1.19					

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.62	.25	25	.37	1.19	15.46
EDIT<	.47	.04	18	.37	.52	8.46

REFLECTANCE HISTOGRAM

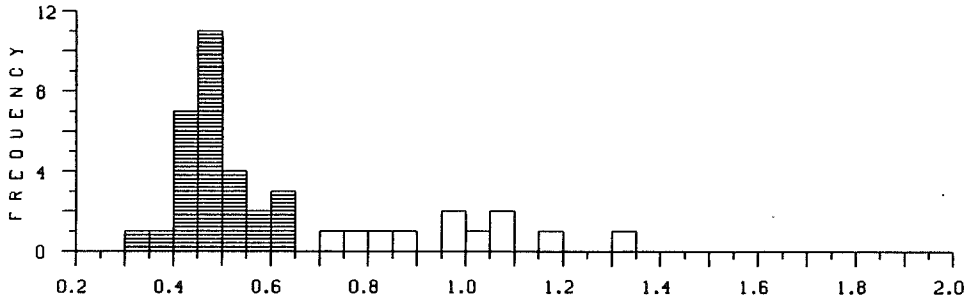


K0685A,2130-2140M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.31<	.39<	.41<	.42<	.43<	.43<	.44<	.44<	.44<	.45<
1	.46<	.47<	.47<	.47<	.48<	.48<	.48<	.48<	.49<	.49<
2	.50<	.51<	.53<	.54<	.56<	.58<	.62<	.62<	.62<	.71
3	.75	.82	.89	.96	.98	1.03	1.07	1.08	1.16	1.30

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.62	.25	40	.31	1.30	24.76
EDIT<	.48	.07	29	.31	.62	14.01

REFLECTANCE HISTOGRAM

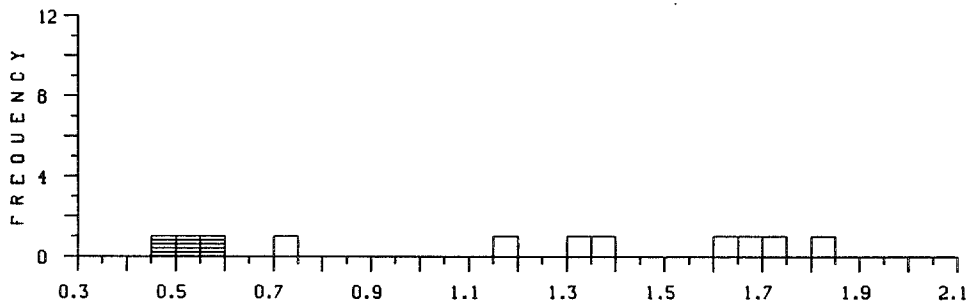


K0686B,2495-2505M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.48<	.52<	.59<	.73	1.19	1.32	1.36	1.62	1.66	1.72
1	1.83									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.18	.52	11	.48	1.83	13.02
EDIT<	.53	.06	3	.48	.59	1.59

REFLECTANCE HISTOGRAM

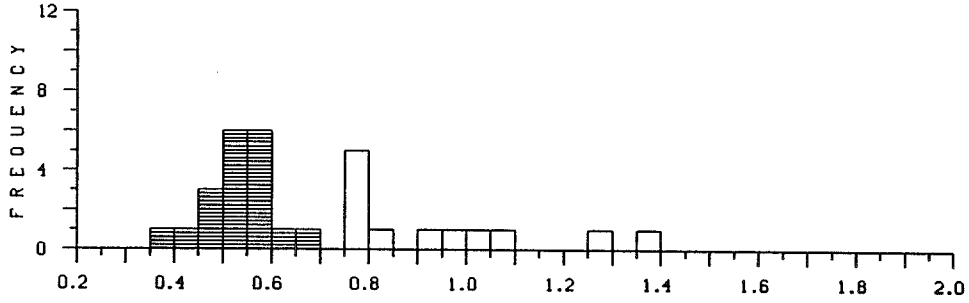


K0687A,2780-2790M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.39<	.41<	.46<	.47<	.49<	.50<	.51<	.51<	.52<	.54<
1	.54<	.55<	.55<	.56<	.57<	.57<	.57<	.62<	.69<	.75
2	.76	.77	.77	.78	.83	.90	.97	1.03	1.08	1.26
3	1.36									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.69	.25	31	.39	1.36	21.28
EDIT<	.53	.07	19	.39	.69	10.02

REFLECTANCE HISTOGRAM

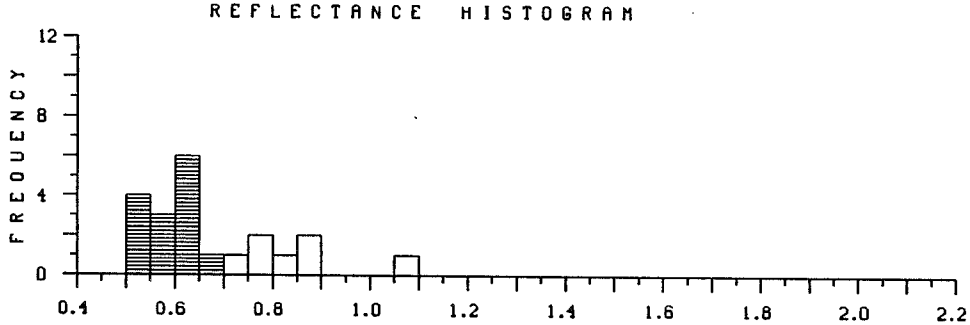


K0688C,3290-3300M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.52<	.53<	.54<	.54<	.57<	.58<	.58<	.61<	.61<	.63<
1	.63<	.64<	.64<	.67<	.73	.76	.79	.83	.87	.88
2	1.08									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.68	.14	21	.52	1.08	14.23
EDIT<	.59	.05	14	.52	.67	8.29

REFLECTANCE HISTOGRAM

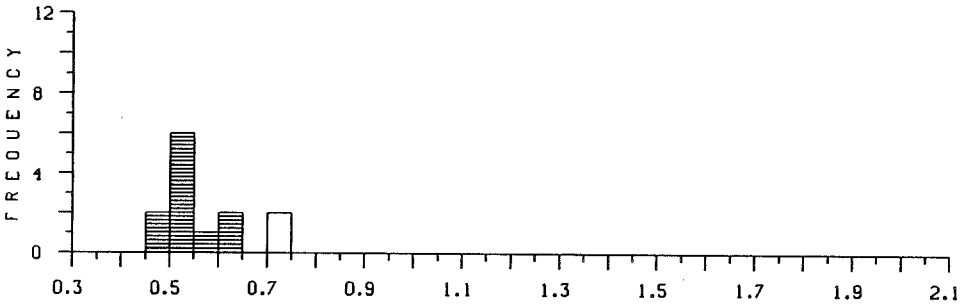


K0688A,3050-3060M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.46<	.46<	.50<	.51<	.52<	.54<	.54<	.54<	.58<	.60<
1	.64<	.70	.74							

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.56	.09	13	.46	.74	7.33
EDIT<	.54	.06	11	.46	.64	5.89

REFLECTANCE HISTOGRAM

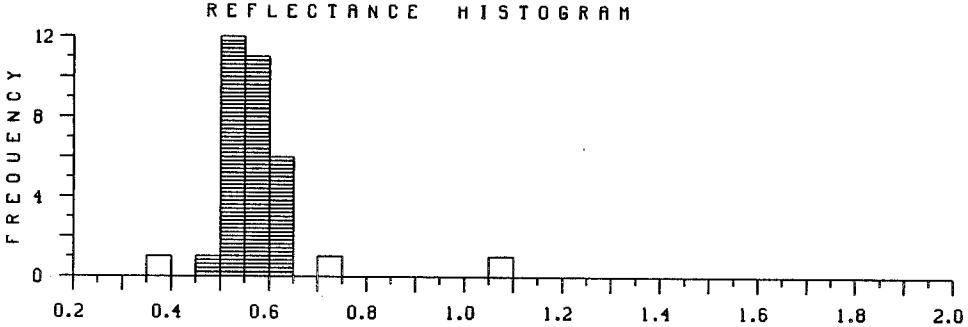


K0689B,3530-3540M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.39	.45<	.51<	.51<	.51<	.51<	.51<	.53<	.53<	.54<
1	.54<	.54<	.54<	.54<	.55<	.55<	.55<	.56<	.56<	.58<
2	.58<	.58<	.58<	.58<	.59<	.60<	.60<	.60<	.61<	.61<
3	.63<	.73	1.06							

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.57	.10	33	.39	1.06	18.85
EDIT<	.56	.04	30	.45	.63	16.67

REFLECTANCE HISTOGRAM

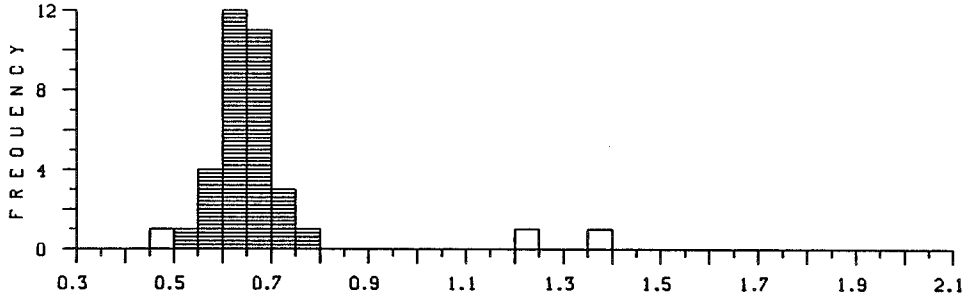


K0690A,3800-3810M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.48	.54<	.55<	.56<	.57<	.59<	.60<	.60<	.61<	.61<
1	.62<	.62<	.62<	.62<	.62<	.63<	.64<	.64<	.65<	.65<
2	.66<	.66<	.66<	.66<	.68<	.68<	.69<	.69<	.69<	.71<
3	.71<	.72<	.76<	1.20	1.35					

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.67	.16	35	.48	1.35	23.54
EDIT<	.64	.05	32	.54	.76	20.51

REFLECTANCE HISTOGRAM

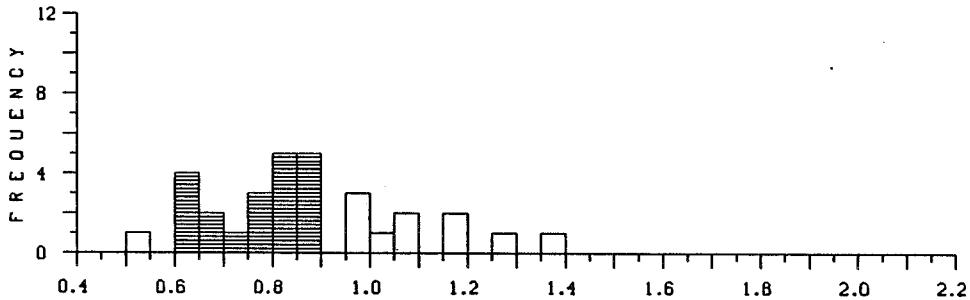


K0691B,4280-4290M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.53	.60<	.62<	.64<	.64<	.66<	.66<	.74<	.75<	.75<
1	.75<	.81<	.82<	.82<	.83<	.84<	.85<	.87<	.88<	.88<
2	.89<	.95	.97	.98	1.02	1.07	1.07	1.16	1.18	1.28
3	1.37									

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.87	.20	31	.53	1.37	26.88
EDIT<	.77	.10	20	.60	.89	15.30

REFLECTANCE HISTOGRAM

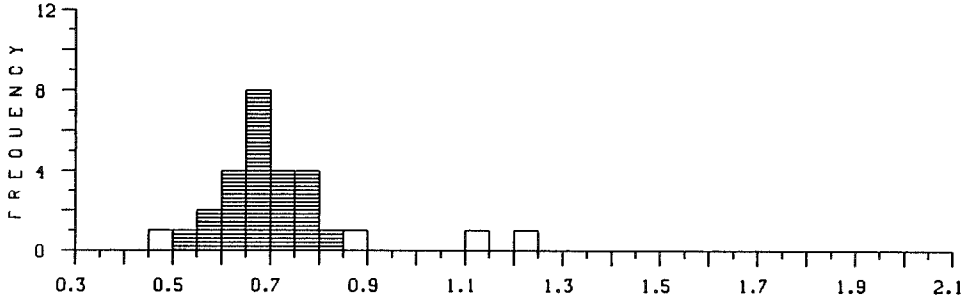


K0690C,4010-4020M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.46	.51<	.56<	.58<	.63<	.63<	.64<	.64<	.65<	.66<
1	.67<	.67<	.68<	.68<	.69<	.69<	.70<	.73<	.73<	.74<
2	.75<	.75<	.76<	.79<	.81<	.87	1.14	1.20		

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.71	.16	28	.46	1.20	20.01
EDIT<	.68	.07	24	.51	.81	16.34

REFLECTANCE HISTOGRAM

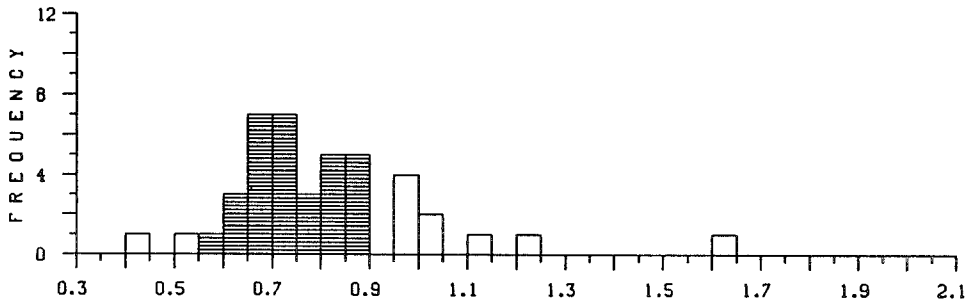


K0692A,4400-4410M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.44	.53	.59<	.62<	.62<	.63<	.65<	.65<	.66<	.67<
1	.67<	.69<	.69<	.71<	.71<	.71<	.71<	.72<	.73<	.74<
2	.75<	.75<	.79<	.82<	.82<	.83<	.84<	.84<	.85<	.86<
3	.87<	.87<	.88<	.96	.97	.97	.98	1.00	1.03	1.10
4	1.20	1.64								

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	.80	.20	42	.44	1.64	33.76
EDIT<	.74	.09	31	.59	.88	22.94

REFLECTANCE HISTOGRAM

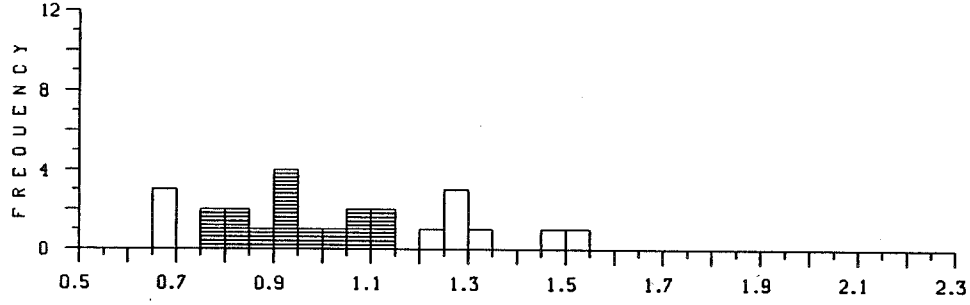


K0692C,4615-4625M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.66	.67	.69	.75<	.79<	.81<	.84<	.88<	.90<	.91<
1	.91<	.93<	.95<	1.02<	1.05<	1.06<	1.10<	1.13<	1.24	1.27
2	1.28	1.28	1.30	1.48	1.54					

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.02	.25	25	.66	1.54	25.44
EDIT<	.94	.12	15	.75	1.13	14.03

REFLECTANCE HISTOGRAM

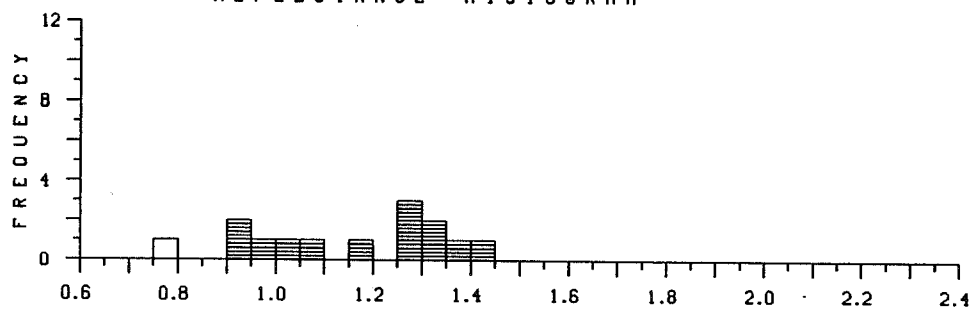


K0694A,4985-4995M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.77	.90<	.90<	.96<	1.04<	1.05<	1.18<	1.25<	1.26<	1.29<
1	1.30<	1.32<	1.35<	1.42<						

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.14	.20	14	.77	1.42	15.99
EDIT<	1.17	.18	13	.90	1.42	15.22

REFLECTANCE HISTOGRAM

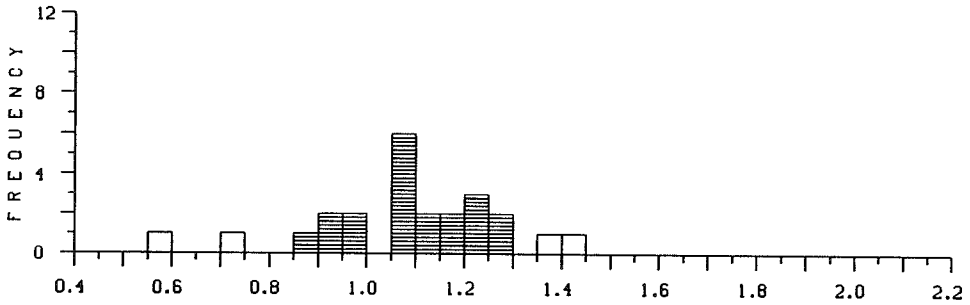


K0693B,4795-4805M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.57	.74	.88<	.91<	.94<	.98<	.99<	1.06<	1.06<	1.06<
1	1.07<	1.08<	1.09<	1.11<	1.12<	1.15<	1.19<	1.21<	1.22<	1.24<
2	1.25<	1.27<	1.36	1.40						

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.08	.19	24	.57	1.40	25.95
EDIT<	1.09	.11	20	.88	1.27	21.88

REFLECTANCE HISTOGRAM

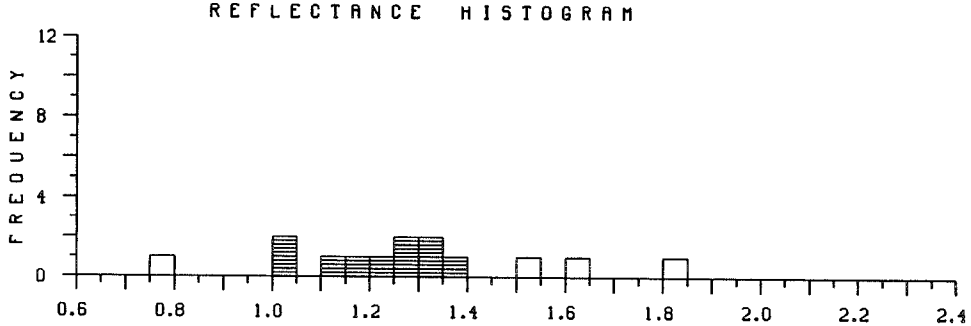


K0694C,5165-5175M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.77	1.01<	1.03<	1.14<	1.15<	1.24<	1.25<	1.29<	1.33<	1.34<
1	1.35<	1.52	1.60	1.82						

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.27	.26	14	.77	1.82	17.84
EDIT<	1.21	.12	10	1.01	1.35	12.13

REFLECTANCE HISTOGRAM

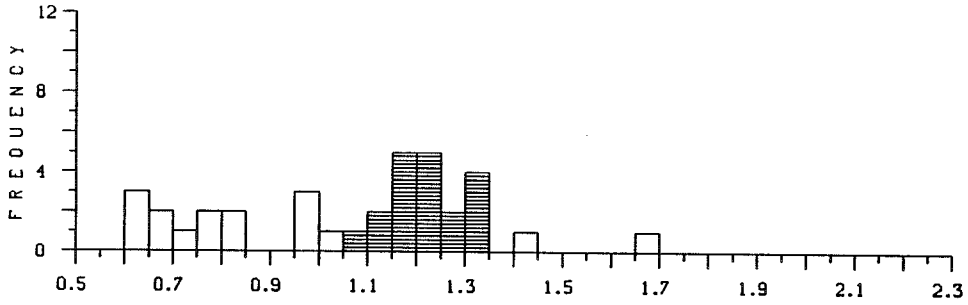


K0695B,5365-5375M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	.61	.62	.62	.66	.68	.72	.77	.78	.81	.82
1	.97	.98	.99	1.00	1.08<	1.12<	1.14<	1.15<	1.15<	1.16<
2	1.18<	1.18<	1.21<	1.22<	1.23<	1.23<	1.24<	1.27<	1.27<	1.31<
3	1.31<	1.33<	1.34<	1.42	1.67					

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.06	.26	35	.61	1.67	37.24
EDIT<	1.22	.07	19	1.08	1.34	23.12

REFLECTANCE HISTOGRAM

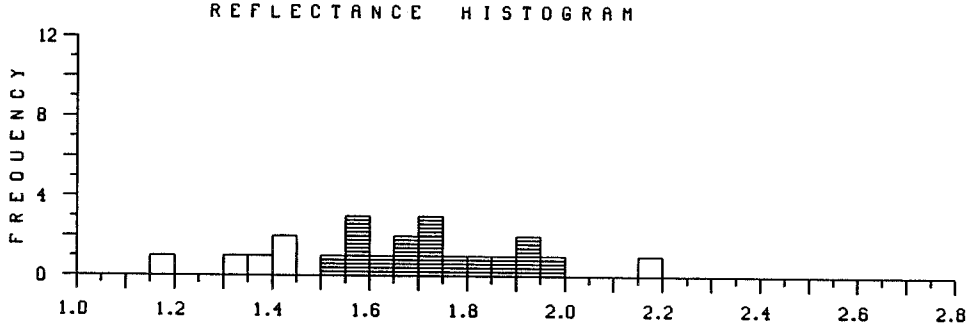


K0696C,5700-5710M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	1.16	1.30	1.39	1.41	1.44	1.50<	1.56<	1.58<	1.58<	1.60<
1	1.68<	1.68<	1.70<	1.71<	1.74<	1.79<	1.82<	1.86<	1.90<	1.92<
2	1.98<	2.17								

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.66	.24	22	1.16	2.17	36.47
EDIT<	1.73	.14	16	1.50	1.98	27.60

REFLECTANCE HISTOGRAM



K0696A,5580-5590M,UNIACKE G-72

COL >	1	2	3	4	5	6	7	8	9	0
ROW	1.23	1.52<	1.54<	1.58<	1.62<	1.65<	1.65<	1.77<	1.79<	1.83<
1	1.83<	1.88<								

	MEAN	STAND DEV	PTS	MIN	MAX	SUM
TOTAL	1.66	.18	12	1.23	1.88	19.89
EDIT<	1.70	.13	11	1.52	1.88	18.66

REFLECTANCE HISTOGRAM