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report # 2707

Vitrinite reflectance (Ro)  
of dispersed organics  
from  
Mobil et al Bluenose 2G-47

M.P. Avery  
Basin Analysis Subdivision  
Atlantic Geoscience Centre, G.S.C., Dartmouth  
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## Vitrinite reflectance (Ro) of dispersed organics from Mobil et al Bluenose 2G-47.

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**G.S.C. Locality No.:** D223

**Location:** 44°06'22.30"N, 59°21'23.05"W

**R.T. Elevation:** 24m

**Water Depth:** 85m

**Total Depth:** 5797m

**Sampled Interval:** 867 - 5759m

**Interval Studied:** 890 - 5755m

**Depth Units:** Meters referenced to R.T.

**Rig Release Date:** September 5, 1983

Vitrinite reflectance has been determined on 28 rotary cuttings samples (Table II) from Mobil et al Bluenose 2G-47 which was classified as a new field wildcat well and is located on the Scotian Shelf approximately 340 km east southeast of Halifax, Nova Scotia and 27 km northeast of Sable Island. Well status is plugged and abandoned, gas discovery.

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

The analysis of the well revealed the thermal maturation intervals given in Table I. The 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\*

|                 |  |
|-----------------|--|
| 85m (sea floor) | 0.15 % Ro immature                               |
| 1587m           | 0.4 % Ro immature approaching maturity           |
| 2278m           | 0.5 % Ro marginally mature                       |
| 2843m           | 0.6 % Ro onset of significant oil generation     |
| 3733m           | 0.8 % Ro peak of oil generation                  |
| 4424m           | 1.0 % Ro onset of significant wet gas generation |
| 4989m           | 1.2 % Ro onset of significant dry gas generation |
| 5354m           | 1.35 % Ro oil floor                              |
| 6571m           | (2.0) % Ro wet gas floor                         |
| 7826m           | (3.0) % Ro dry gas floor                         |
| 5797m T.D.      | 1.56 % Ro maturity at total depth                |

Note: ( )'s indicate Ro has been extrapolated at 0.140 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 very complete over the section penetrated by Bluenose 2G-47. The data were 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 deceptively small for samples with very few readings. The slope of the maturation line is 0.140 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 linear trends 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.

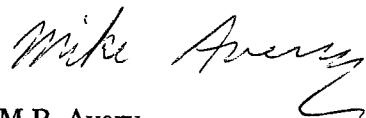
These vitrinite reflectance data provide evidence that the thermal regime at Bluenose 2G-47 is suitable for the generation and preservation of hydrocarbons within the drilled section, between 2278 and 5797m (T.D.), assuming potential source rocks and traps are present.

References

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.

March 25, 1993



M.P. Avery  
Basin Analysis

c.c. K.D. McAlpine, BAS, Dartmouth  
J.A. Wade, BAS, Dartmouth  
A.E. Jackson, BAS, Dartmouth  
BAS Files, Dartmouth  
G.R. Morrell, NEB, Calgary  
S. Bigelow, CNSOPB, Halifax (3 copies)

Central Technical Files, Ottawa  
J.S. Bell, ISPG, Calgary  
L.R. Snowdon, ISPG, Calgary  
D. Skibo, ISPG, Calgary  
C. Beaumont, Dalhousie Univ., Halifax

Table II  
**Summary of kerogen - based vitrinite reflectance**

| Seq. # | Sample Labels | Depths in feet | Mean Ro (SD)<br>non-rotated | Number of Readings |        |
|--------|---------------|----------------|-----------------------------|--------------------|--------|
|        |               |                |                             | Total              | Edited |
| 1      | K0836A        | 890-930        | 0.29 ( $\pm .04$ )          | 21                 | 21     |
| 2      | K0836B        | 1100-1110      | 0.36 ( $\pm .03$ )          | 18                 | 18     |
| 3      | K0836C        | 1220-1230      | 0.37 ( $\pm .03$ )          | 13                 | 13     |
| 4      | K0837A        | 1400-1410      | 0.42 ( $\pm .07$ )          | 14                 | 14     |
| 5      | K0837B        | 1555-1565      | 0.46 ( $\pm .04$ )          | 12                 | 12     |
| 6      | K0837C        | 1675-1715      | 0.42 ( $\pm .04$ )          | 24                 | 24     |
| 7      | K0838A        | 1975-1985      | 0.46 ( $\pm .06$ )          | 29                 | 28     |
| 8      | K0838B        | 2140-2150      | 0.47 ( $\pm .05$ )          | 22                 | 22     |
| 9      | K0838C        | 2320-2330      | 0.55 ( $\pm .05$ )          | 13                 | 13     |
| 10     | K0839A        | 2500-2540      | 0.54 ( $\pm .06$ )          | 22                 | 22     |
| 11     | K0839B        | 2680-2720      | 0.56 ( $\pm .06$ )          | 15                 | 15     |
| 12     | K0839C        | 2890-2900      | 0.65 ( $\pm .03$ )          | 20                 | 20     |
| 13     | K0840A        | 3010-3020      | 0.64 ( $\pm .05$ )          | 23                 | 23     |
| 14     | K0840B        | 3250-3260      | 0.67 ( $\pm .05$ )          | 28                 | 28     |
| 15     | K0840C        | 3400-3410      | 0.70 ( $\pm .07$ )          | 36                 | 36     |
| 16     | K0841A        | 3550-3560      | 0.74 ( $\pm .06$ )          | 23                 | 23     |
| 17     | K0841B        | 3730-3740      | 0.77 ( $\pm .08$ )          | 31                 | 31     |
| 18     | K0841C        | 3930-3940      | 0.77 ( $\pm .06$ )          | 32                 | 32     |
| 19     | K0842A        | 4080-4090      | 0.75 ( $\pm .05$ )          | 28                 | 28     |
| 20     | K0842B        | 4290-4300      | 0.82 ( $\pm .07$ )          | 36                 | 36     |
| 21     | K0842C        | 4440-4450      | 0.84 ( $\pm .06$ )          | 31                 | 31     |
| 22     | K0843A        | 4620-4630      | 1.01 ( $\pm .09$ )          | 11                 | 11     |
| 23     | K0843B        | 4770-4780      | 1.01 ( $\pm .06$ )          | 13                 | 11     |
| 24     | K0843C        | 4980-4990      | 1.17 ( $\pm .12$ )          | 5                  | 5      |
| 25     | K0844A        | 5280-5320      | 1.52 ( $\pm .08$ )          | 32                 | 29     |
| 26     | K0844B        | 5490-5500      | 1.61 ( $\pm .13$ )          | 18                 | 17     |
| 27     | K0844C        | 5625-5635      | 1.74 ( $\pm .09$ )          | 23                 | 22     |
| 28     | K0845A        | 5745-5755      | 1.82 ( $\pm .10$ )          | 15                 | 14     |

Note: All samples are preparations of isolated kerogen obtained from rotary cuttings.

Table III  
**Formation Tops (MacLean and Wade, 1993)**

| Formation            | Depth      |
|----------------------|------------|
| Banquereau           | in casing  |
| Wyandot              | 1434m      |
| Dawson Canyon        | 1504m      |
| Petrel Member        | 1525-1529m |
| Logan Canyon         | 1624m      |
| Marmora Member       | 1624m      |
| Sable Member         | 1904m      |
| Cree Member          | 1994m      |
| Naskapi Member       | 2779m      |
| Missisauga           | 2946m      |
| upper member         | 2946m      |
| "O" Marker           | 3185-3284m |
| middle member        | 3284m      |
| lower member         | 4003m      |
| Top of Over Pressure | 4580m      |
| Mic Mac              | 4962m      |
| Total Depth          | 5797m      |

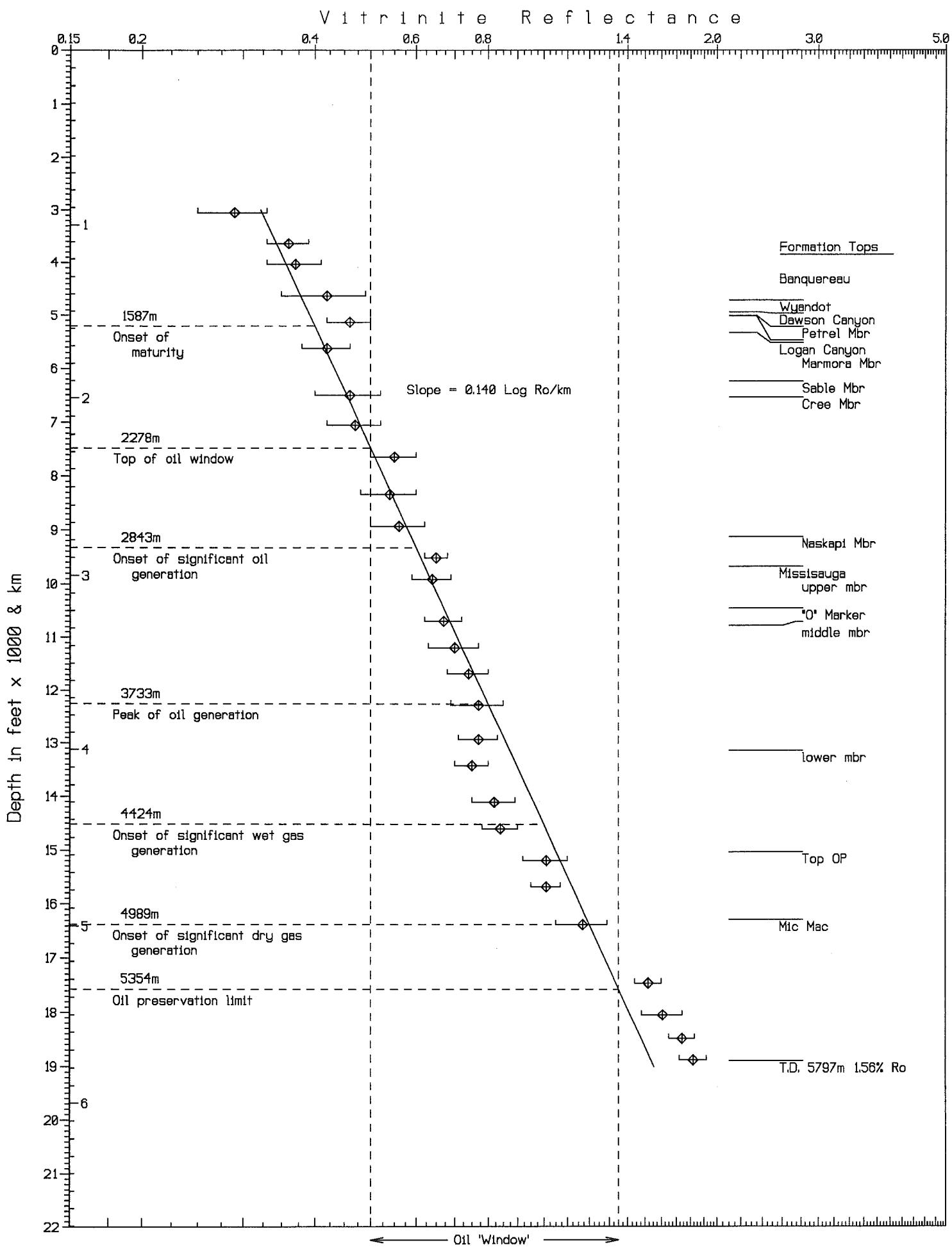


Fig. 1 Bluenose 2G-47

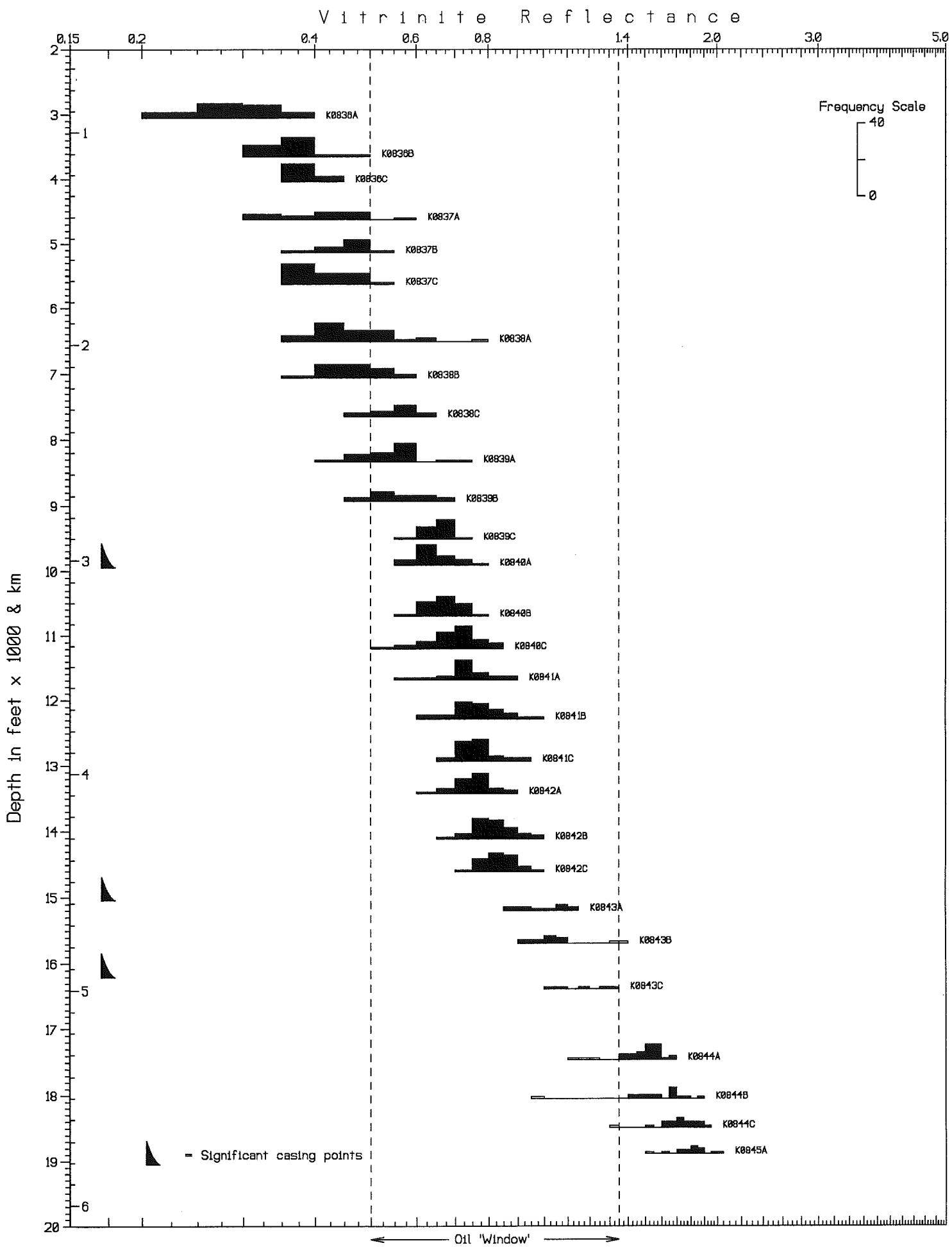


Fig. 2 Bluenose 2G-47 <Histograms>

## APPENDIX I

### Sample Preparation Method

#### **Kerogen Concentrate**

##### COGLA Lab preparation

Preliminary wash

Dry samples 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

Place 20-30 grams 250 ml plastic beaker.

Add 10% HC1 till reaction ceases (removes carbonates).

Wash (rinsed) 3 times.

Conc. HF overnight (removes silicates).

Wash (rinsed) 3 times.

Heat (60-65°C) conc. HC1 (remove fluorides caused by HF).

Wash 3 times.

Transfer to 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

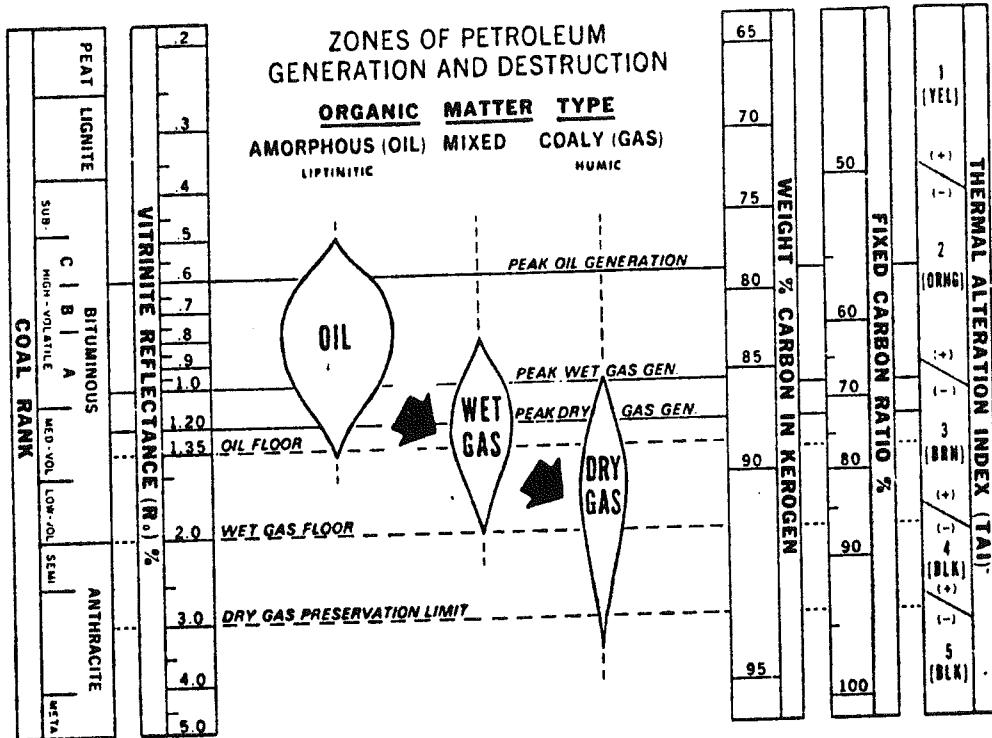
Pipette off excess water and place in plastic stubs (made to fit polisher).

Freeze dry and fix material for polishing with epoxy resin (Struer's EPOFIX).

Polish with diamond based suspension to obtain low relief, scratch free surface.

Examine under oil lens, incident light at approximately 1000x mag'n.

Appendix II (Dow, 1977)

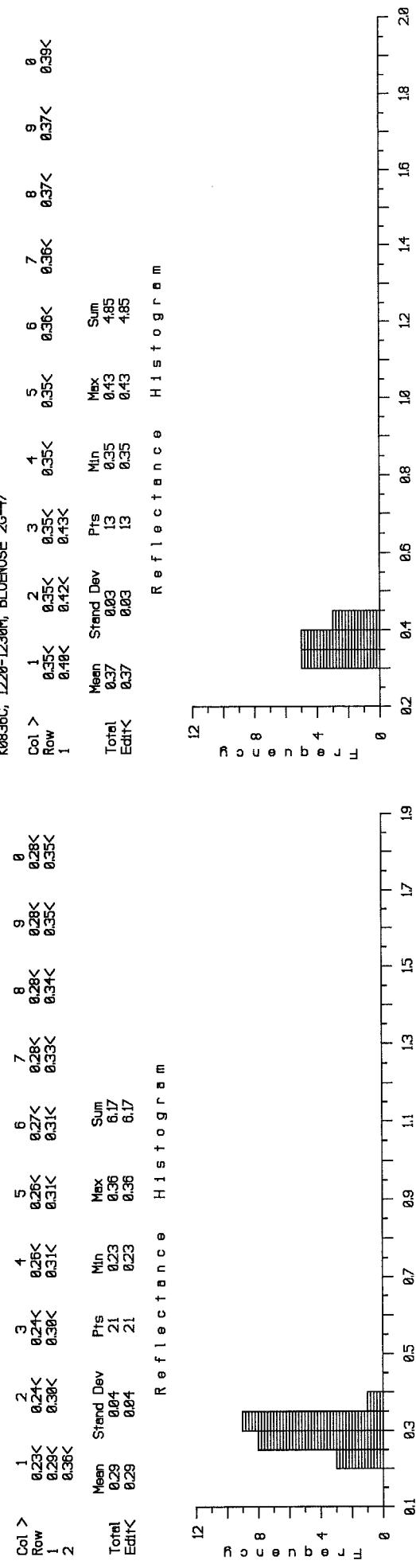


Note: In this report, the terminology used to describe the various maturation levels has been modified. The 'peak' designation, as used in this figure, has been changed to 'onset of significant' and 0.8 Ro is here used as the 'peak of oil generation'

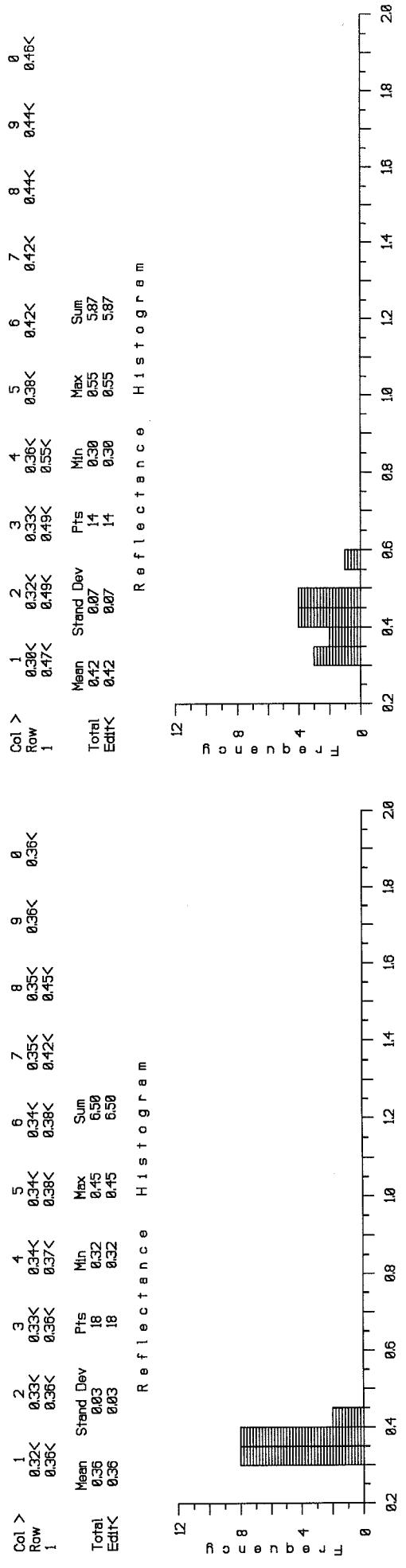
### **Appendix III**

#### **Reflectance Histograms**

K0836A, 890-930M, BLUENOSE 26-47



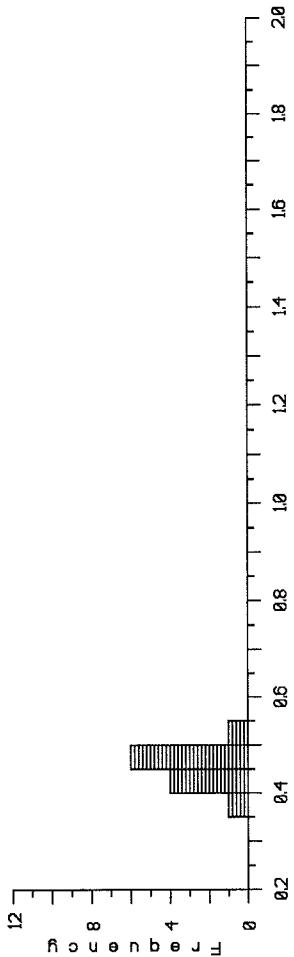
K0836B, 1100-1110M, BLUENOSE 26-47



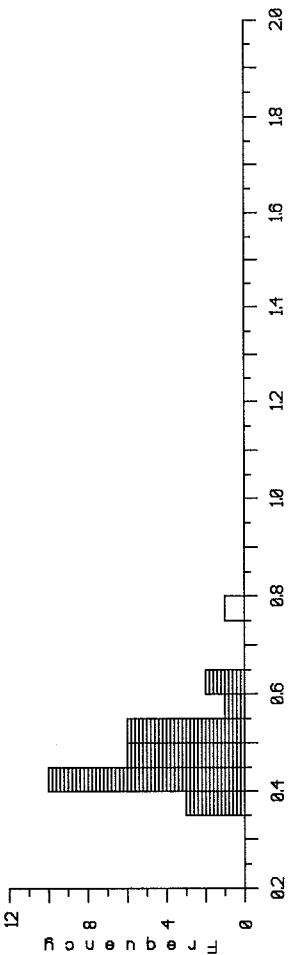
K0837B, 1555-1565M, BLUENOSE 2G-47

| Col > | 1                       | 2                       | 3                       | 4                       | 5                       | 6                       | 7                       | 8                       | 9                       | 0     | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< |
|-------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Row   | 0.38<<br>0.42<<br>0.53< | 0.42<<br>0.44<<br>0.53< | 0.44<<br>0.44<<br>0.53< | 0.45<<br>0.45<<br>0.53< | 0.45<<br>0.47<<br>0.53< | 0.47<<br>0.47<<br>0.53< | 0.47<<br>0.47<<br>0.53< | 0.49<<br>0.49<<br>0.53< | 0.49<<br>0.49<<br>0.53< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< | 0.49< |
| Total | Mean<br>0.46            | Stand Dev<br>0.04       | Pts<br>12               | Min<br>0.38             | Max<br>0.53             | Sum<br>5.56             |                         |                         |                         |       |       |       |       |       |       |       |       |       |       |       |
| Edit< |                         |                         |                         |                         |                         |                         |                         |                         |                         |       |       |       |       |       |       |       |       |       |       |       |

Reflection Histogram



Reflection Histogram

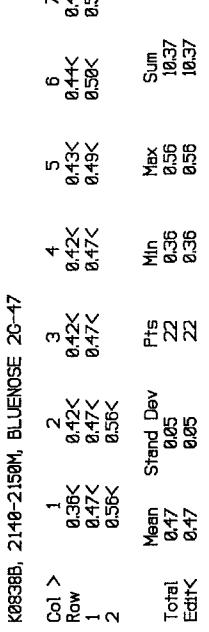
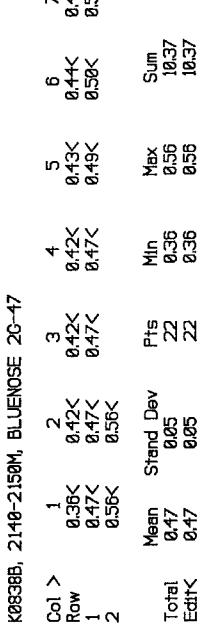
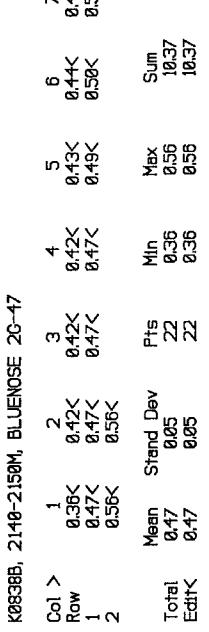
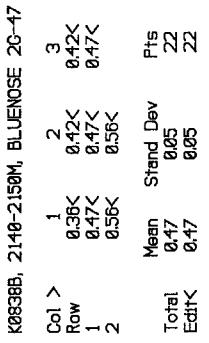


Reflection Histogram

K0837C, 1675-1715M, BLUENOSE 2G-47

| Col > | 1                       | 2                       | 3                       | 4                       | 5                       | 6              | 7              | 8              | 9              | 0     | 0.38< | 0.38< | 0.38< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< |
|-------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|----------------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Row   | 0.36<<br>0.39<<br>0.41< | 0.36<<br>0.40<<br>0.43< | 0.36<<br>0.41<<br>0.45< | 0.38<<br>0.41<<br>0.49< | 0.38<<br>0.41<<br>0.50< | 0.38<<br>0.44< | 0.39<<br>0.44< | 0.39<<br>0.45< | 0.39<<br>0.45< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< | 0.39< |
| Total | Mean<br>0.42            | Stand Dev<br>0.04       | Pts<br>24               | Min<br>0.36             | Max<br>0.50             | Sum<br>10.00   |                |                |                |       |       |       |       |       |       |       |       |       |       |       |
| Edit< |                         |                         |                         |                         |                         |                |                |                |                |       |       |       |       |       |       |       |       |       |       |       |

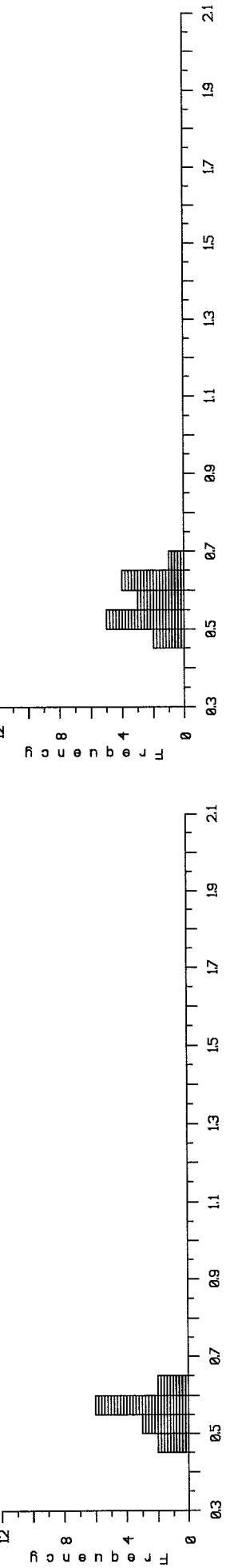
Reflection Histogram



K0838C, 2320-2330M, BLUENOSE 2G-47

| Col >       | Row 1          | Row 2          | Row 3          | Row 4 | Row 5 | Row 6 | Row 7 | Row 8 | Row 9 | Row 10 | Row 11 | Row 12 |
|-------------|----------------|----------------|----------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Mean        | 0.46<<br>0.59< | 0.49<<br>0.60< | 0.50<<br>0.61< | 0.51< | 0.52< | 0.56< | 0.57< | 0.57< | 0.57< | 0.57<  | 0.57<  | 0.57<  |
| Stand Dev   | 0.05           | 0.05           | 0.05           | 0.05  | 0.05  | 0.05  | 0.05  | 0.05  | 0.05  | 0.05   | 0.05   | 0.05   |
| Total Edit< | 0.55           | 0.55           | 0.55           | 0.55  | 0.55  | 0.55  | 0.55  | 0.55  | 0.55  | 0.55   | 0.55   | 0.55   |

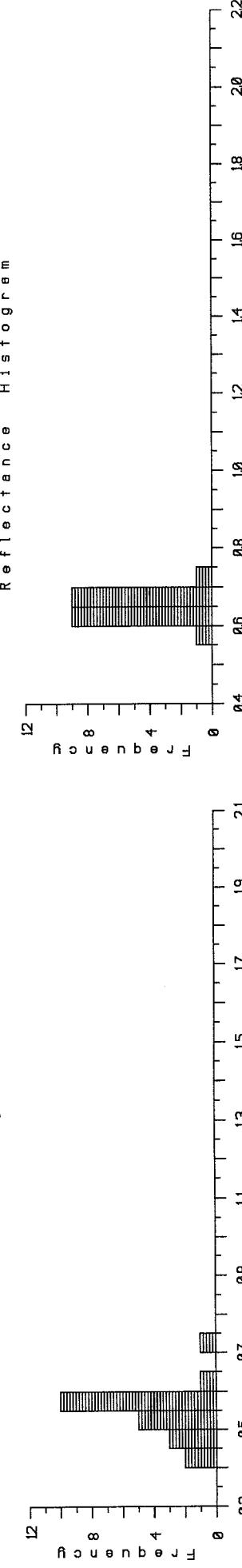
Reflection Histogram



K0839A, 2500-2540M, BLUENOSE 2G-47

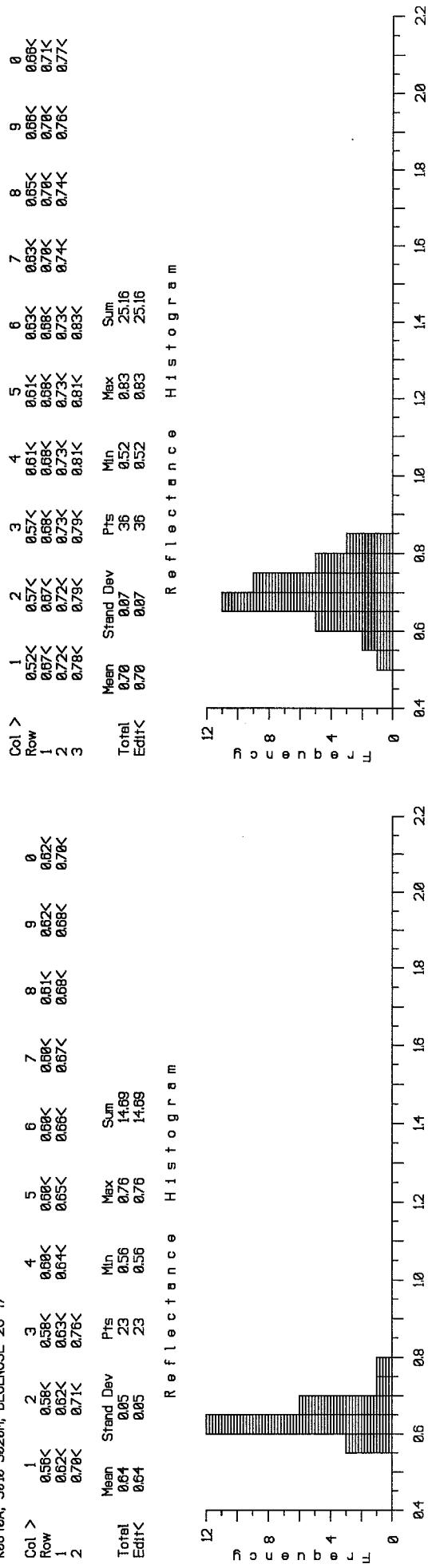
| Col >       | Row 1          | Row 2          | Row 3          | Row 4          | Row 5          | Row 6          | Row 7          | Row 8          | Row 9          | Row 10         | Row 11         | Row 12         |
|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Mean        | 0.44<<br>0.65< | 0.45<<br>0.71< | 0.46<<br>0.71< | 0.46<<br>0.71< | 0.47<<br>0.71< | 0.48<<br>0.71< | 0.50<<br>0.71< | 0.51<<br>0.71< | 0.51<<br>0.71< | 0.53<<br>0.71< | 0.53<<br>0.71< | 0.53<<br>0.71< |
| Stand Dev   | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           | 0.06           |
| Total Edit< | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           | 0.54           |

Reflection Histogram

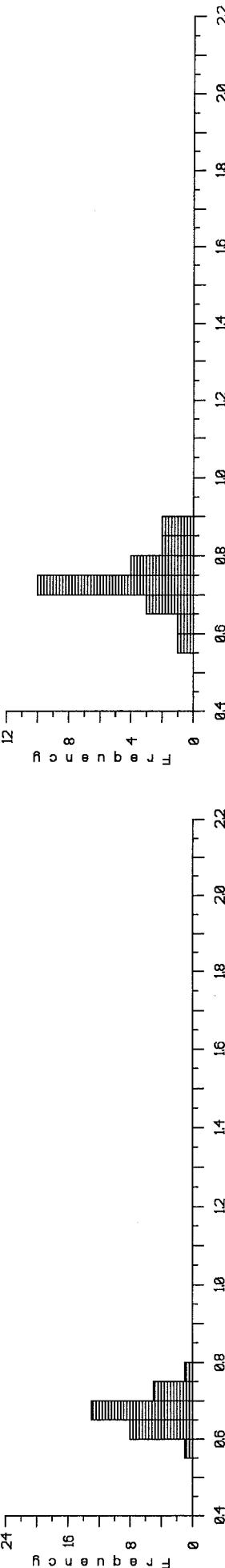
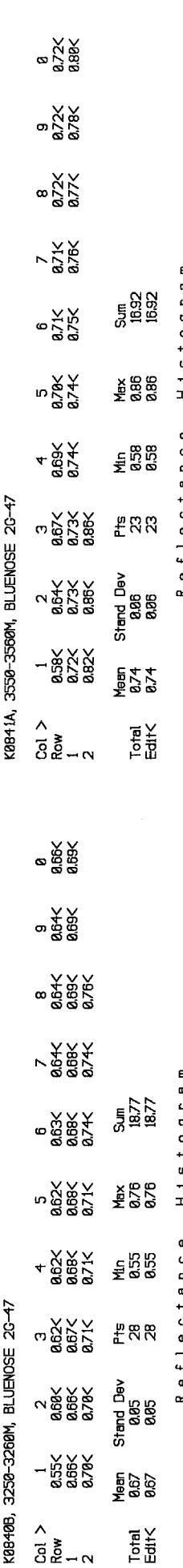


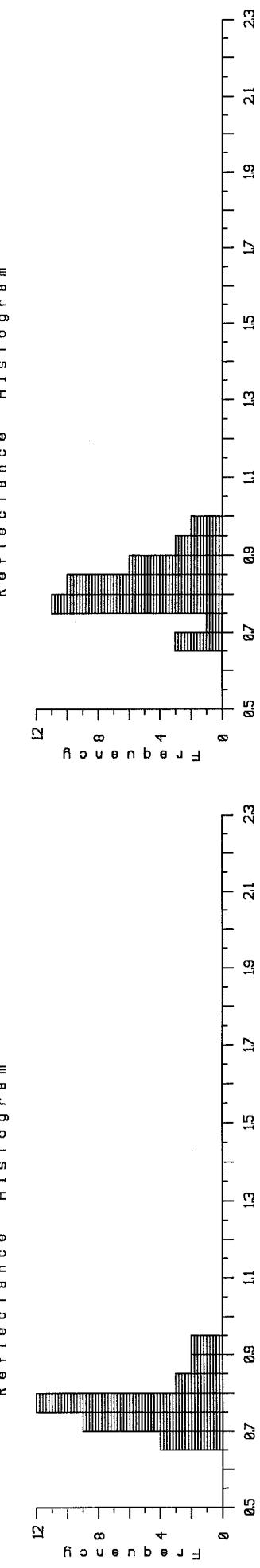
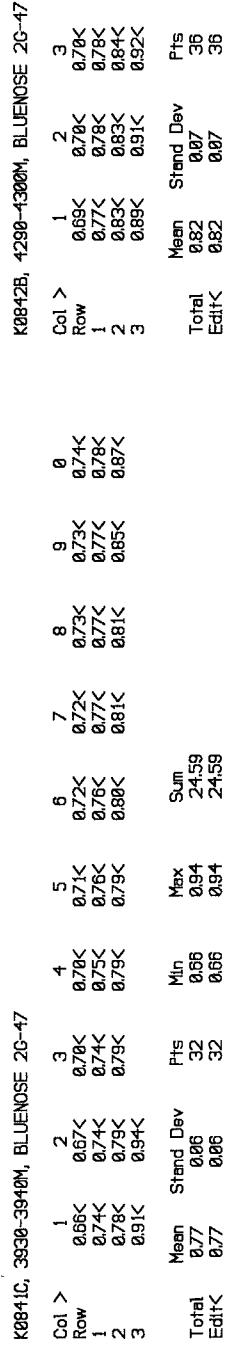
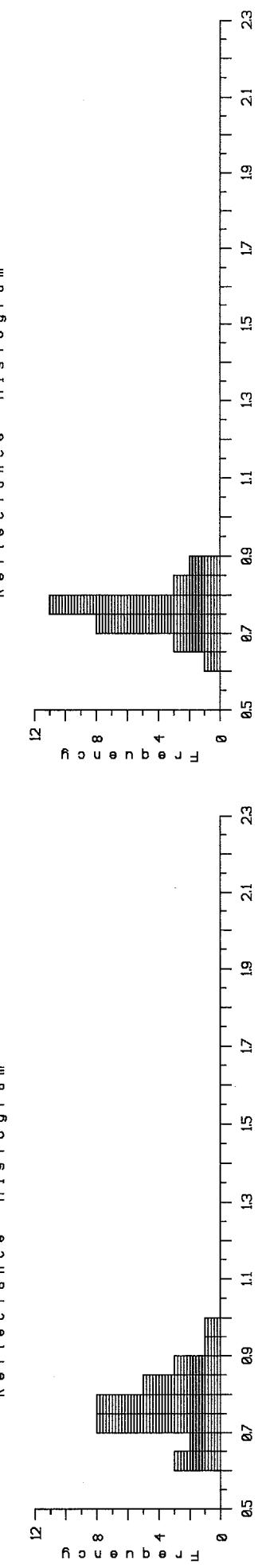
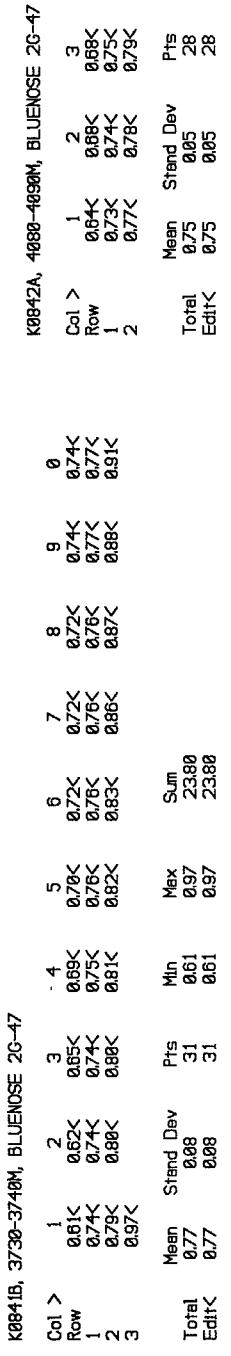
K0840B, 3250-3260M, BLUENOSE 2G-47

K0840C, 3400-3410M, BLUENOSE 2G-47

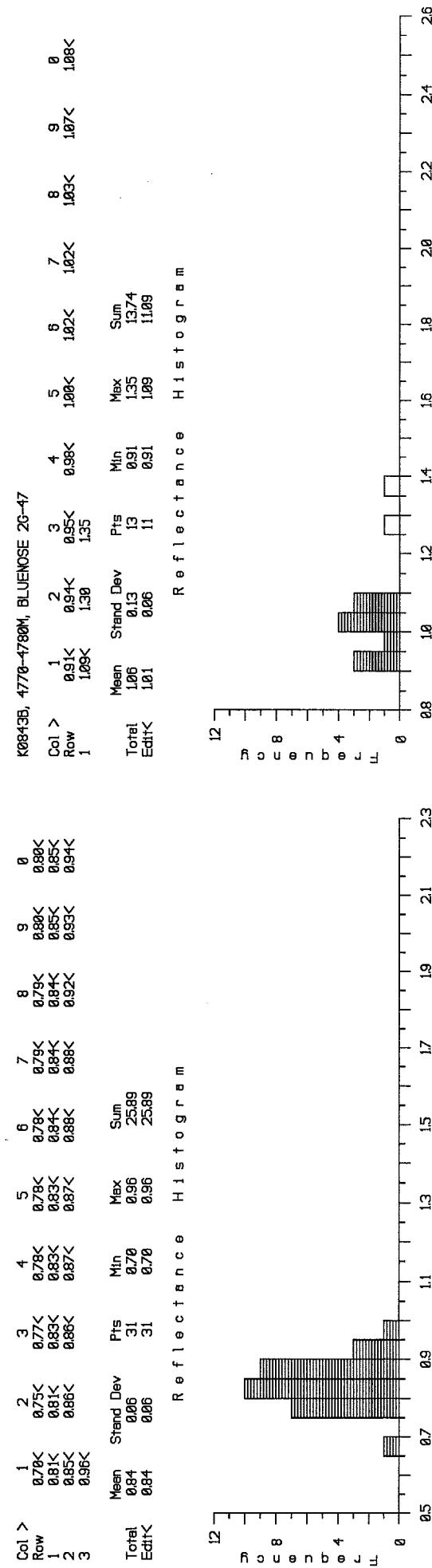


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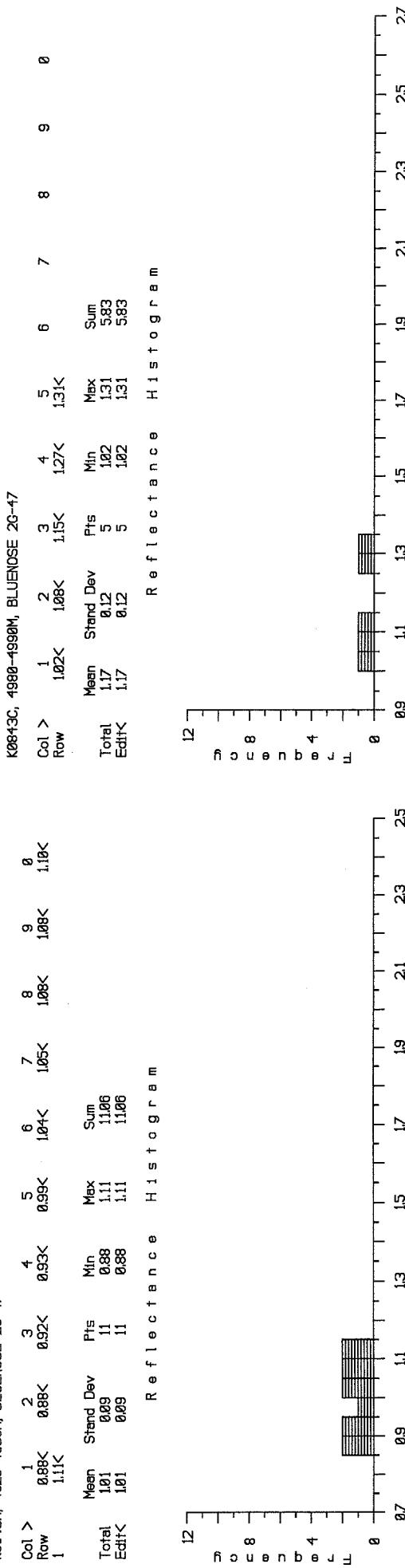




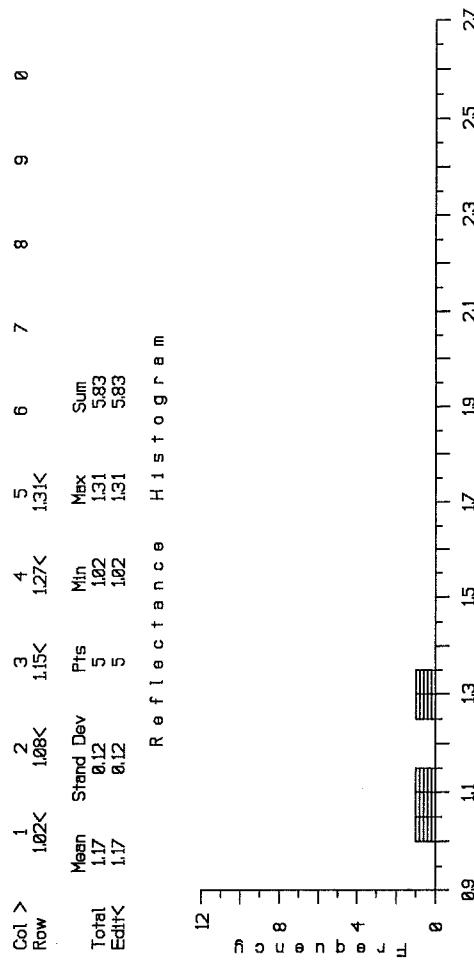
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K0843A, 4620-4630M, BLUENOSE 2G-47



K0843C, 4990-4990M, BLUENOSE 2G-47



K0844A, 5280-5320M, BLUENOSE 2G-47

Col &gt; K0844C, 5625-5635M, BLUENOSE 2G-47

Row 1.11 1.19 1.20 1.26&lt;

1 1.49&lt; 1.49&lt; 1.51&lt; 1.53&lt;

2 1.54&lt; 1.56&lt; 1.57&lt; 1.59&lt;

3 1.66&lt; 1.68&lt; 1.68&lt; 1.68&lt;

Total Mean 1.49 0.13

Edit&lt; 0.08

Stand Dev 0.13

Pts 32

Min 1.11

Sum 47.62

Max 1.68

44.12

1.36

1.37&lt;

1.51&lt;

1.52&lt;

1.53&lt;

1.59&lt;

K0844B, 5490-5500M, BLUENOSE 2G-47

Col &gt; K0844A, 5745-5755M, BLUENOSE 2G-47

Row 0.97 1.42&lt;

1 1.66&lt; 1.66&lt;

2 1.43&lt; 1.43&lt;

3 1.45&lt; 1.45&lt;

4 1.45&lt; 1.45&lt;

5 1.53&lt; 1.53&lt;

6 1.53&lt; 1.53&lt;

7 1.78&lt; 1.78&lt;

8 1.55&lt; 1.55&lt;

9 1.89&lt; 1.89&lt;

0 1.65&lt; 1.65&lt;

Total Mean 1.57

Edit&lt; 1.61

Stand Dev 0.20

Pts 18

Min 0.97

Sum 28.32

Max 1.89

27.35

1.42

1.42

1.42

1.42

1.42

1.42

1.42

1.42

1.42

1.42

1.42

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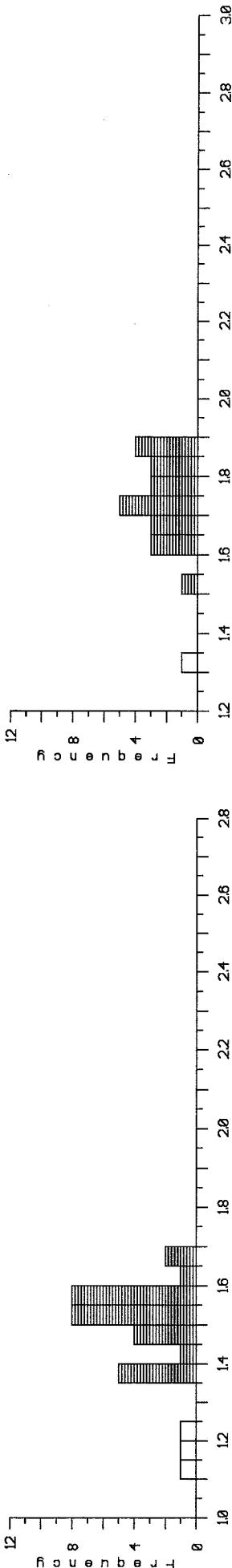
1.42

1.42

1.42

1.42

1.42



K0844B, 5490-5500M, BLUENOSE 2G-47

Col &gt; K0844A, 5745-5755M, BLUENOSE 2G-47

Row 1.54 1.85&lt;

1 1.85&lt; 1.85&lt;

2 1.71&lt; 1.71&lt;

3 1.74&lt; 1.74&lt;

4 1.93&lt; 1.93&lt;

5 1.76&lt; 1.76&lt;

6 2.00&lt; 2.00&lt;

7 1.77&lt; 1.77&lt;

8 1.81&lt; 1.81&lt;

9 1.84&lt; 1.84&lt;

0 1.84&lt; 1.84&lt;

Total Mean 1.88

Edit&lt; 1.82

Stand Dev 0.12

Pts 15

Min 1.54

Max 1.61

Sum 27.00

Dev 2.00

2.00

2.00

2.00

2.00

2.00

2.00

2.00

2.00

