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Vitrinite reflectance (Ro)
of dispersed organics
from
Shell PCI et al South Debarres O-76

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March 15, 1993

Vitrinite reflectance (Ro) of dispersed organics from Shell PCI et al South Debarres O-76.

G.S.C. Locality No.: D250

Location: 44°05'56.06"N, 59°55'59.01"W

R.T. Elevation: 23.7m

Water Depth: 69m

Total Depth: 6039m

Sampled Interval: 900 - 6035m

Interval Studied: 900 - 5957m

Depth Units: Meters referenced to R.T.

Rig Release Date: October 13, 1984

Vitrinite reflectance has been determined on 31 rotary cuttings samples and 3 conventional core samples (Table II) from Shell PCI et al South Debarres O-76 which was classified as a new field wildcat well and is located on the Scotian Shelf approximately 295 km east southeast of Halifax, Nova Scotia. Well status is plugged and abandoned.

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*

69m (sea floor)	0.15 % Ro immature
2339m	0.4 % Ro immature approaching maturity
2864m	0.5 % Ro marginally mature
3294m	0.6 % Ro onset of significant oil generation
3971m	0.8 % Ro peak of oil generation
4496m	1.0 % Ro onset of significant wet gas generation
4925m	1.2 % Ro onset of significant dry gas generation
5202m	1.35 % Ro oil floor
6127m	(2.0) % Ro wet gas floor
7082m	(3.0) % Ro dry gas floor
6039m (T.D.)	1.93 % Ro maturity at total depth

Note: ()'s indicate Ro has been extrapolated at 0.184 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 good over the section penetrated by South Debarres O-76. The three conventional core samples provide good control in determining the maturation trend since the significant problem of contamination from cavings is eliminated in these samples. 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 0.184 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.

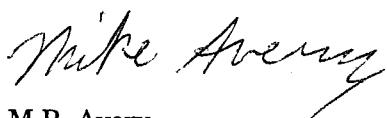
The results from the VR data in this report were compared to an earlier report (Avery, 1991). In that report VR was determined on a single conventional core sample. This point was plotted on Figure 1 to demonstrate the comparison. This older data point supports the maturation profile produced from the data in this report.

These vitrinite reflectance data provide evidence that the thermal regime at South Debarres O-76 is suitable for the generation and preservation of hydrocarbons within the drilled section, between 2864 and 6039m (T.D.), assuming potential source rocks and traps are present.

References

- Avery, M.P., 1991. Vitrinite reflectance (Ro) of dispersed organics from conventional cores from seven Scotian Shelf wells. Geological Open File report # 2455.
- 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.

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Table II

Summary of kerogen - based vitrinite reflectance

Seq. #	Sample Labels	Depths in feet	Mean Ro (SD) non-rotated	Number of Readings Total	Readings Edited
1	W0008A	895-905	0.23(±.05)	7	7
2	W0008B	1060-1065	0.23(±.04)	10	10
3	W0008C	1195-1200	0.26(±.05)	12	12
4	W0009A	1365-1370	0.25(±.04)	4	4
5	W0009B	1490-1495	0.31(±.03)	10	10
6	W0009C	1655-1660	0.33(±.08)	11	10
7	W0010A	1780-1785	0.33(±.03)	18	13
8	W0010B	2110-2115	0.34(±.04)	14	13
9	W0010C	2300-2305	0.42(±.04)	20	20
10	W0011A	2460-2465	0.40(±.04)	24	24
11	W0011B	2575-2580	0.45(±.05)	20	16
12	W0011C	2725-2730	0.53(±.09)	30	30
13	W0012A	2875-2880	0.53(±.07)	29	28
14	W0012B	3025-3030	0.60(±.05)	19	18
15	W0012C	3165-3170	0.63(±.07)	37	37
16	W0013A	3285-3290	0.60(±.07)	30	30
17	W0013B	3465-3470	0.61(±.05)	24	24
18	W0013C	3595-3600	0.54(±.04)	21	20
19	W0014A	3770-3775	0.61(±.05)	28	28
20	W0014B	3815.0	0.66(±.07)	35	35
21	W0014C	3910-3915	0.74(±.06)	26	26
22	W0015A	4045-4050	0.75(±.08)	40	39
23	W0015B	4355-4360	0.79(±.04)	28	23
24	W0015C	4505-4510	0.92(±.08)	21	15
25	W0016A	4650-4655	0.98(±.06)	25	21
26	W0016B	4785-4790	1.09(±.09)	24	22
27	W0016C	4895-4900	1.17(±.09)	7	6
28	W0017A	5050-5055	1.25(±.10)	13	11
29	W0017B	5195-5200	1.37(±.06)	4	4
30	W0017C	5350-5355	1.39(±.11)	4	4
31	W0018A	5505-5510	1.64(±.09)	17	17
32	W0018B	5655-5660	1.69(±.16)	6	6
33	W0019B	5955.0	2.22(±.12)	35	33
34	W0019C	5957.0	2.38(±.13)	23	23

Note: Samples preparations are whole rock picked shales which were obtained from rotary cuttings except W0014B, W0019B & W0019C which were taken from conventional core.

Table III
Formation Tops (MacLean and Wade, 1993)

Formation	Depth
Banquereau	in casing
Wyandot	1108m
Dawson Canyon	1164m
Petrel Member	1271-1277m
Logan Canyon	1388m
Naskapi Member	2385m
Missisauga	2508m
upper member	2508m
"O" Marker	2790-2831m
middle member	2831m
lower member	3572m
Mic Mac	3860m
Top of Over Pressure	4570m
Total Depth	6039m

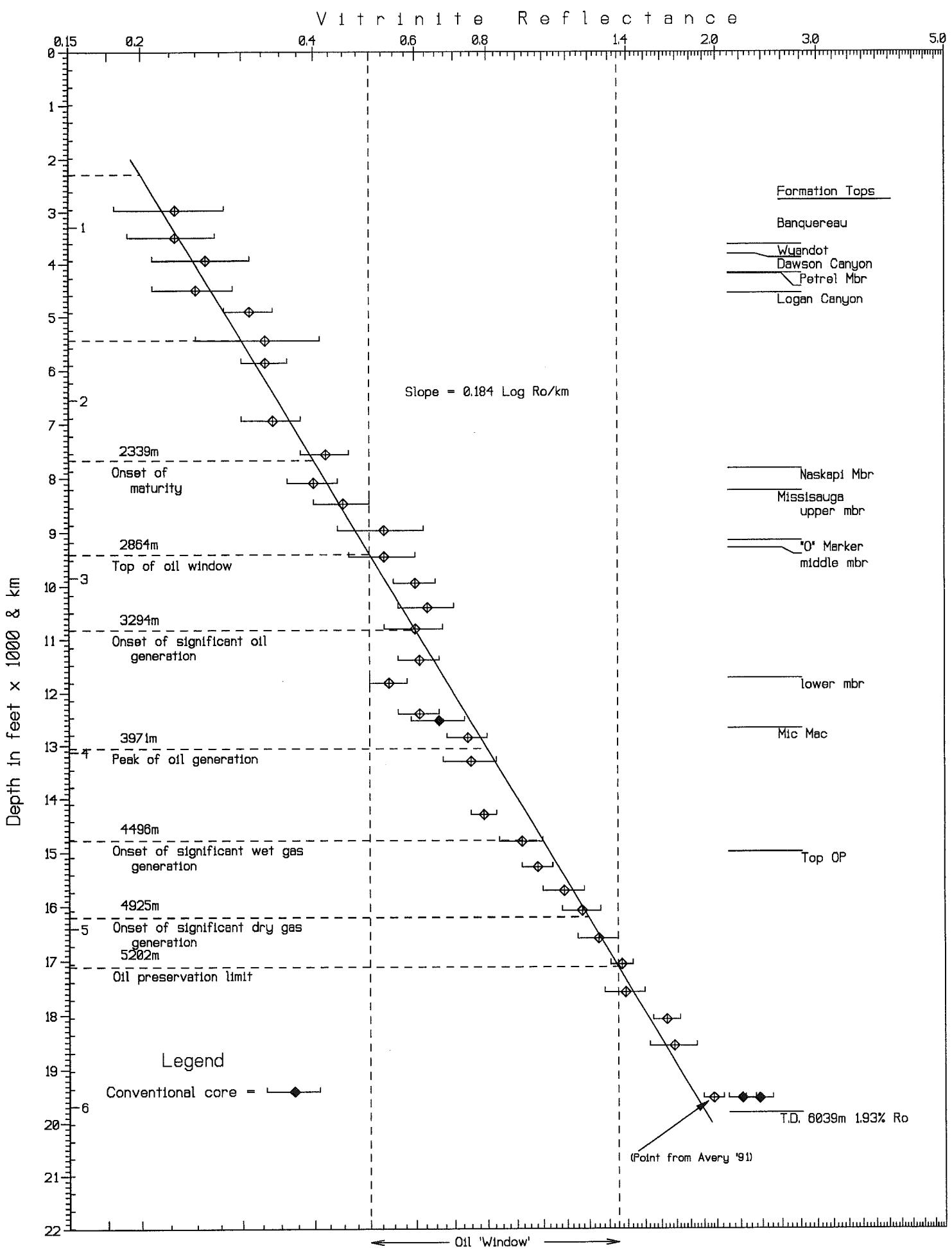


Fig. 1 South Debarres 0-76

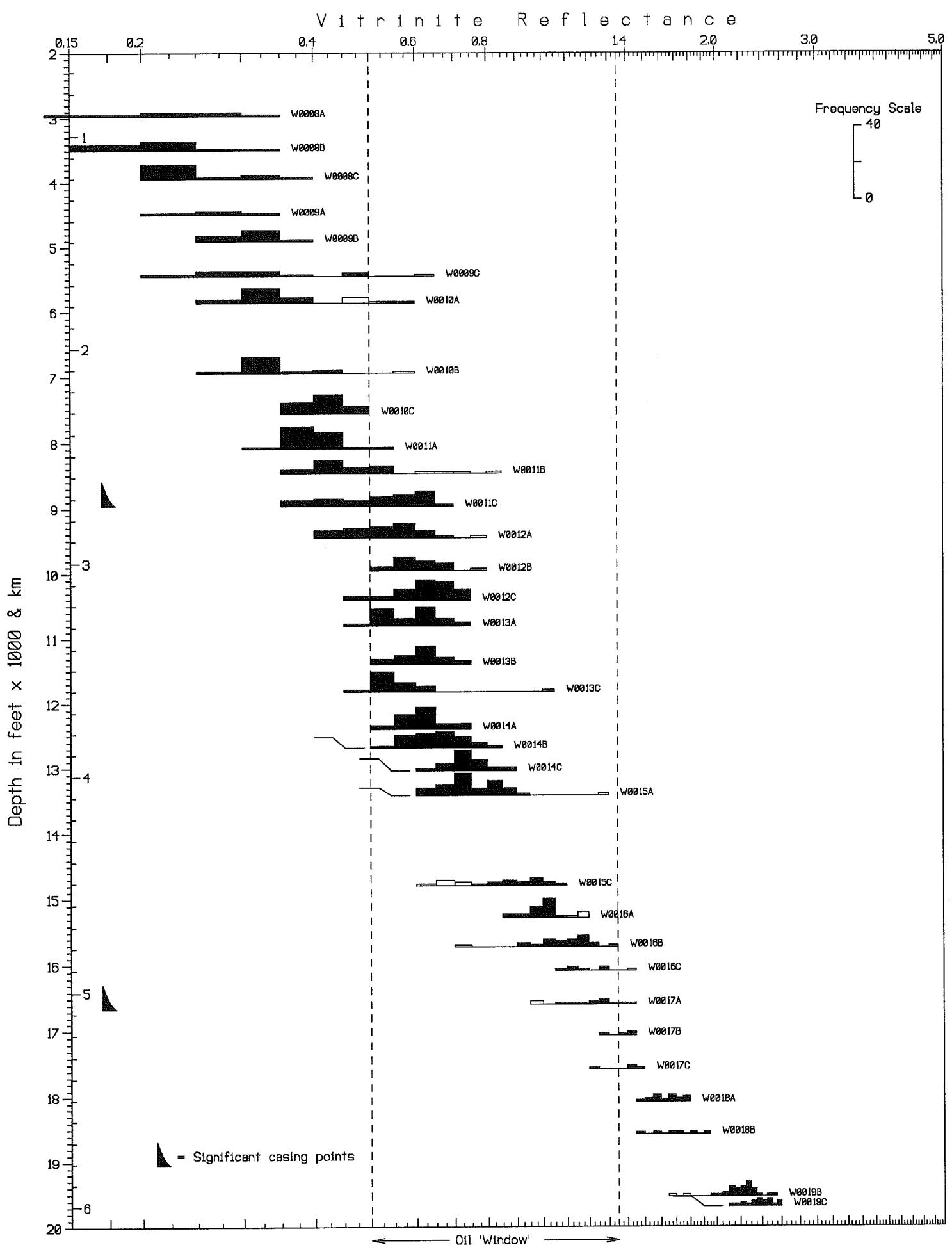


Fig. 2 South Debarres 0-76 <histograms>

APPENDIX I

Sample Preparation Method

Whole Rock (Vitrinite Reflectance lab prep only)

Preliminary wash & air dry.

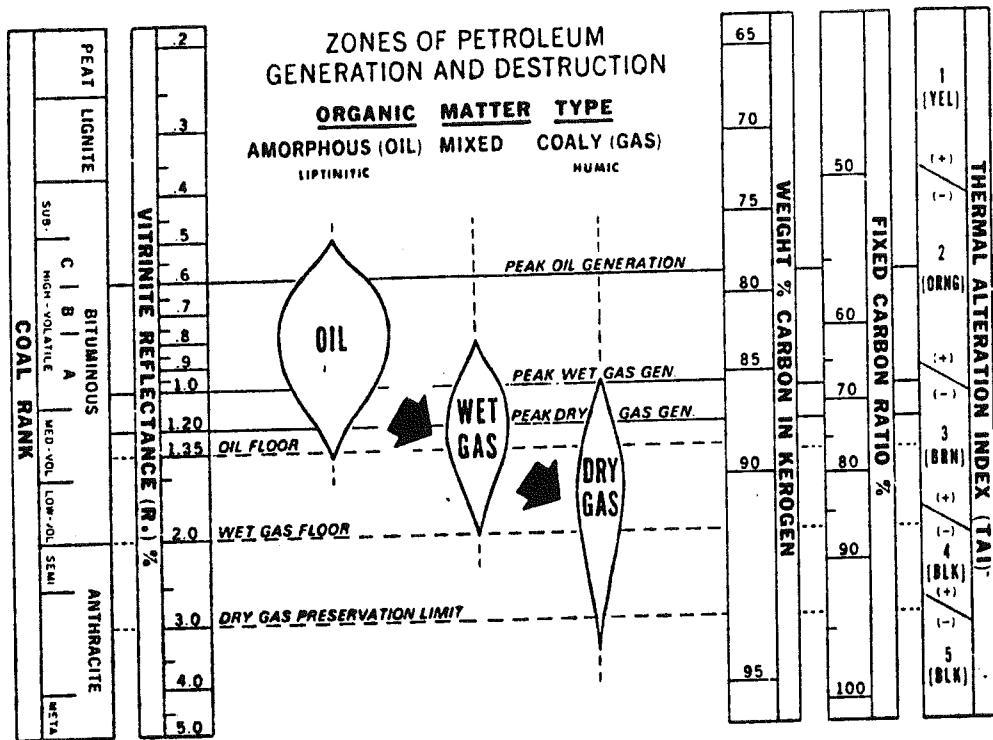
Crush to \approx 1mm.

Mold into 1" stub (to fit polishing equipment) with epoxy resin (EPOFIX).

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

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

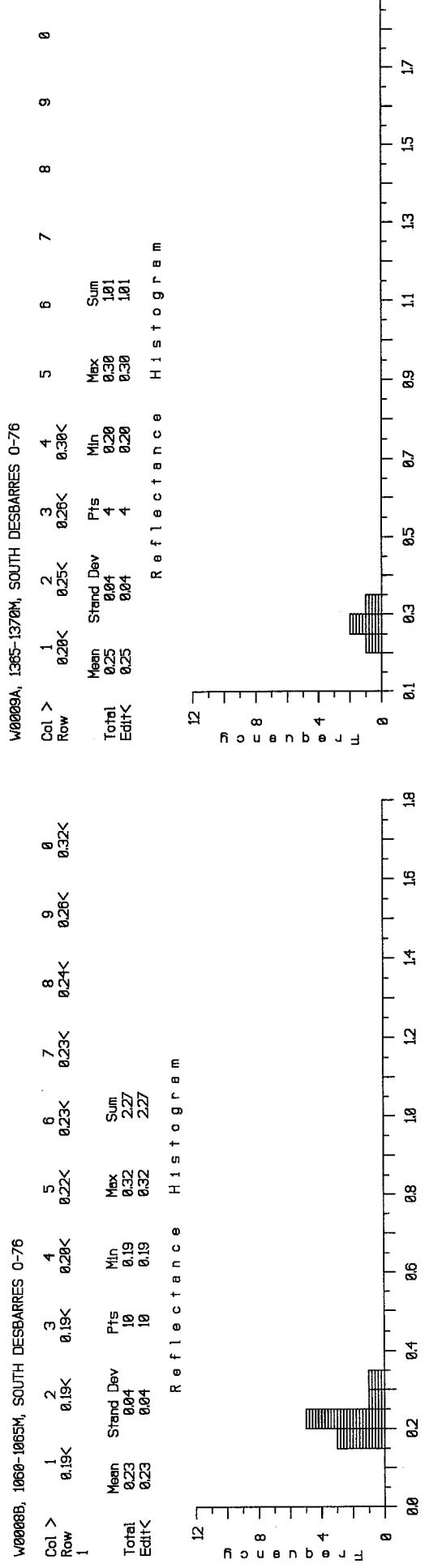
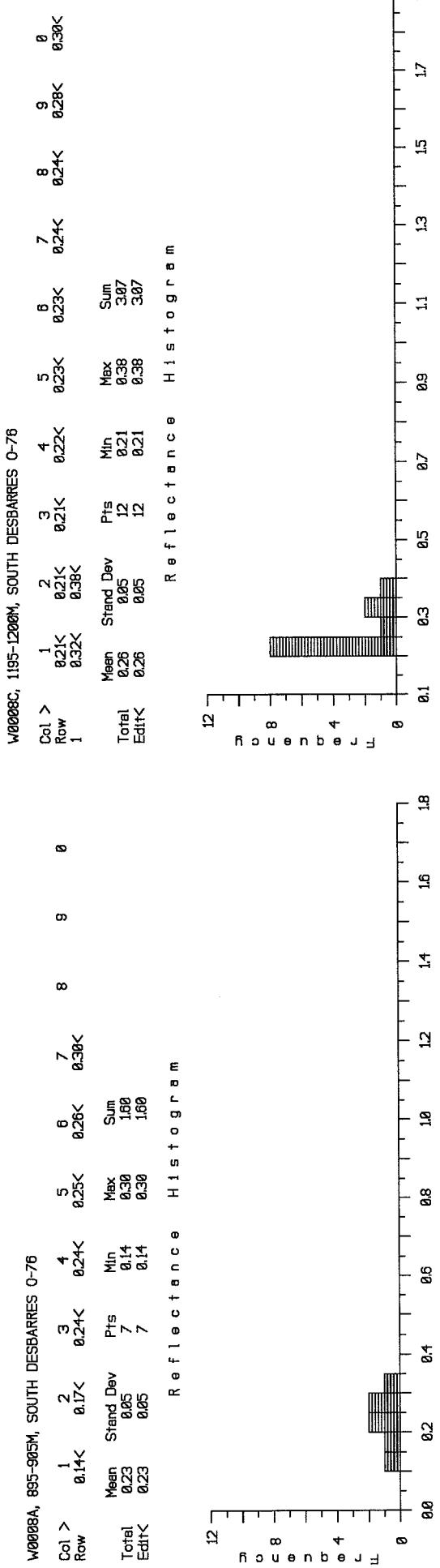
Appendix II (Dow, 1977)



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

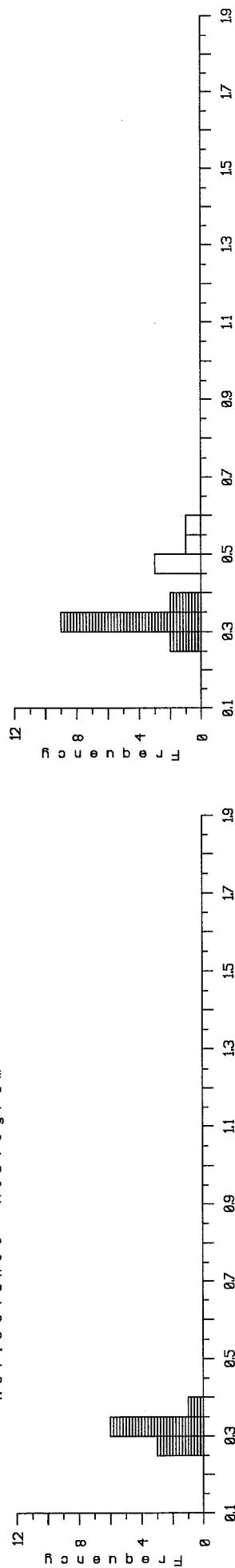
Reflectance Histograms



W0089B, 1498-1495M, SOUTH DESBARRES 0-76

Col >	1	2	3	4	5	6	7	8	9	0	0.34<	0.37<
Row 1	0.27<	0.27<	0.29<	0.38<	0.30<	0.30<	0.32<	0.33<	0.34<	0.37<		
Total	Mean 0.31	Stand Dev 0.03	Pts 10	Min 0.27	Max 0.37	Sum 3.09						
Edit<	0.31	0.03	10	0.27	0.37	3.09						

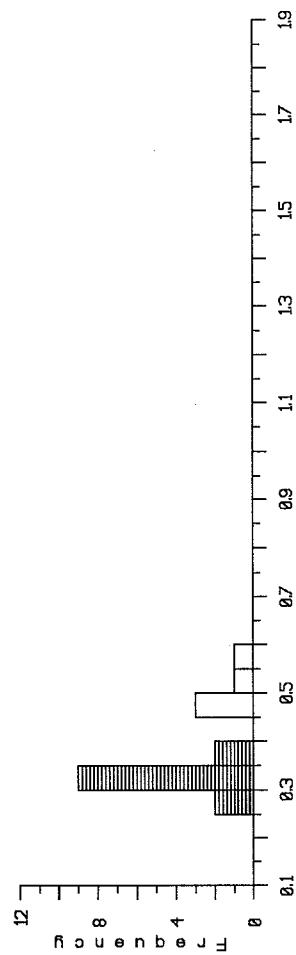
Reflection Histogram



W0010A, 1780-1785M, SOUTH DESBARRES 0-76

Col >	1	2	3	4	5	6	7	8	9	0	0.32<	0.34<
Row 1	0.27<	0.27<	0.29<	0.38<	0.30<	0.30<	0.32<	0.33<	0.34<	0.37<		
Total	Mean 0.31	Stand Dev 0.03	Pts 10	Min 0.27	Max 0.37	Sum 3.09						
Edit<	0.31	0.03	10	0.27	0.37	3.09						

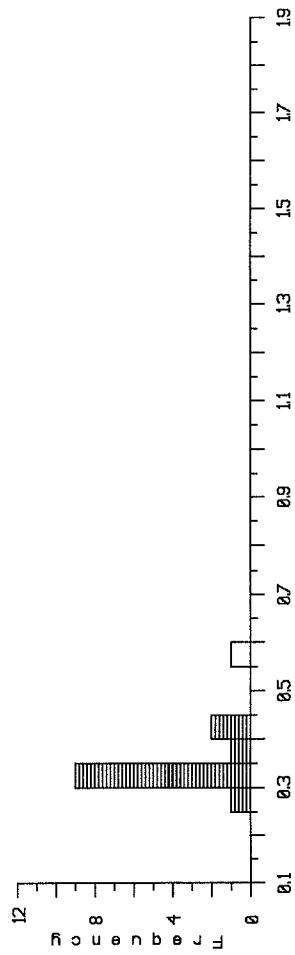
Reflection Histogram



W0089C, 1655-1660M, SOUTH DESBARRES 0-76

Col >	1	2	3	4	5	6	7	8	9	0	0.46<	0.47<
Row 1	0.23<	0.26<	0.28<	0.29<	0.31<	0.33<	0.35<	0.38<	0.39<	0.46<		
Total	Mean 0.36	Stand Dev 0.03	Pts 11	Min 0.23	Max 0.62	Sum 3.96						
Edit<	0.33	0.03	10	0.23	0.47	3.34						

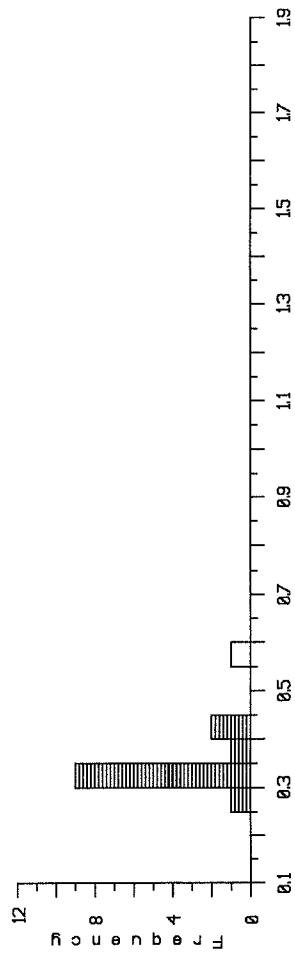
Reflection Histogram

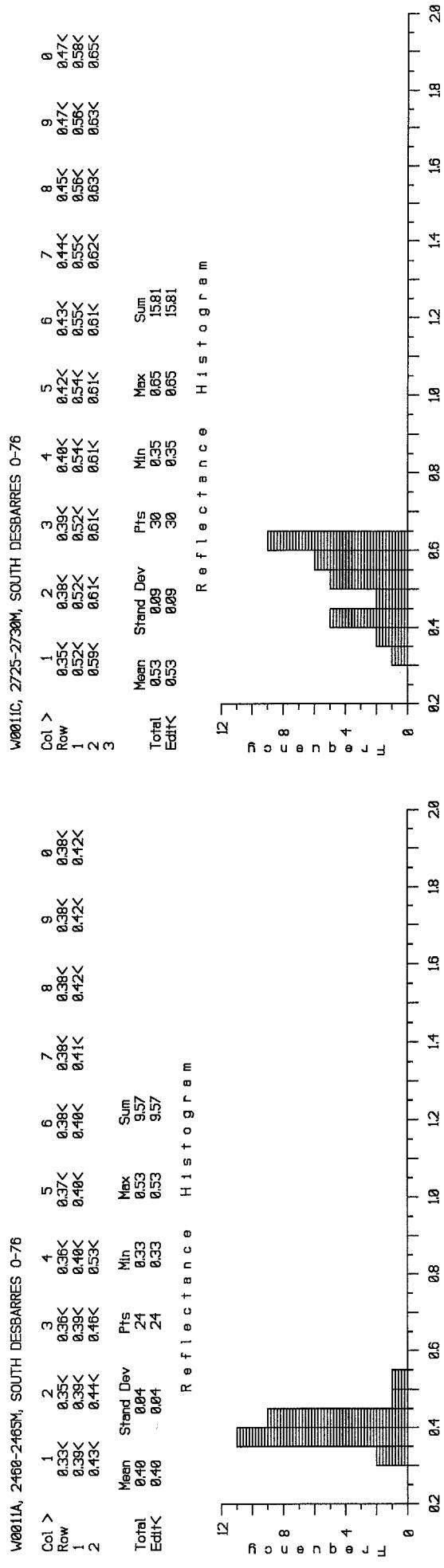
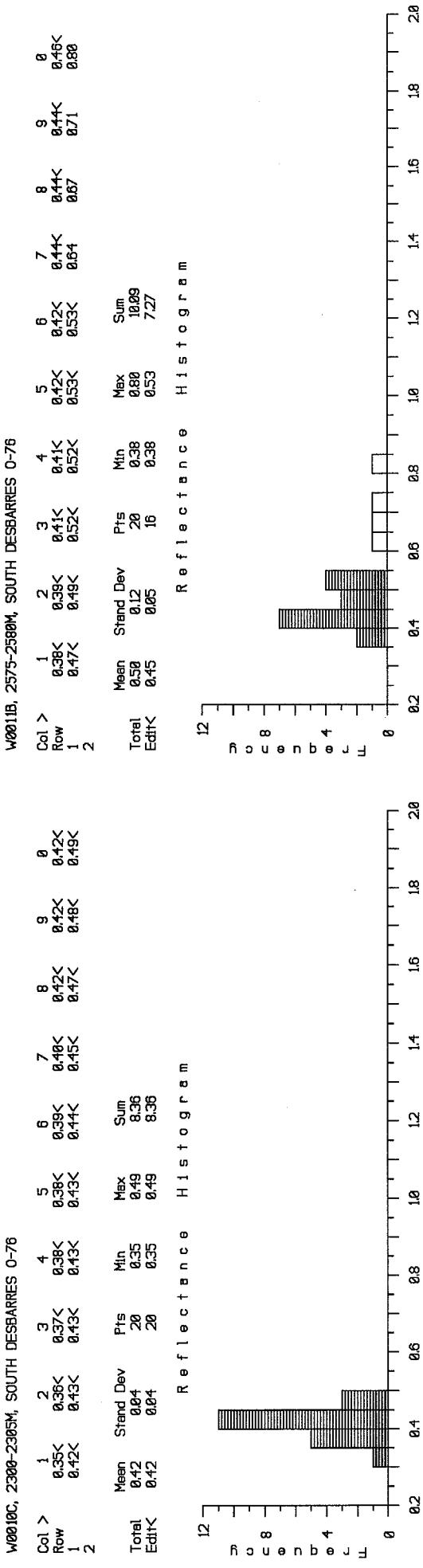


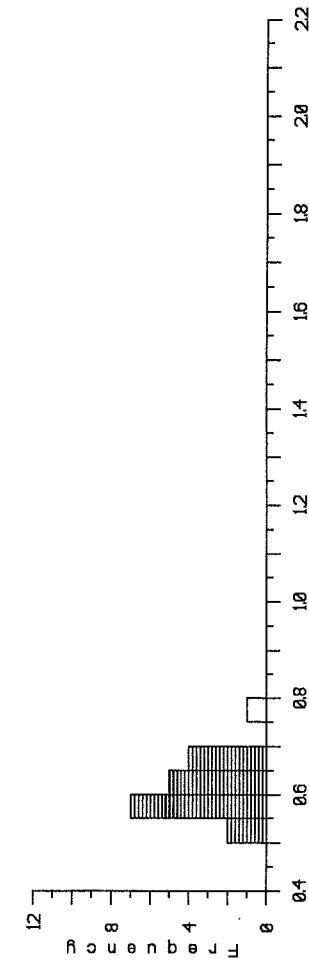
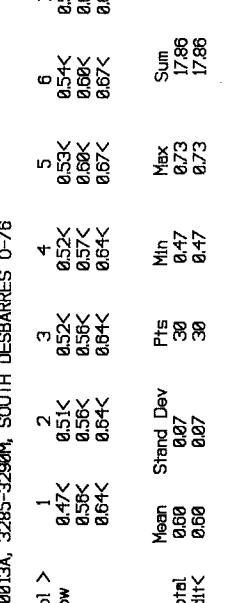
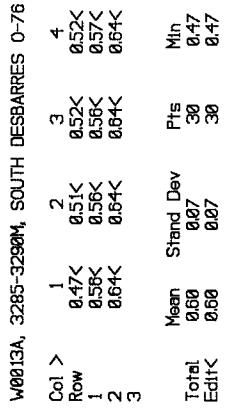
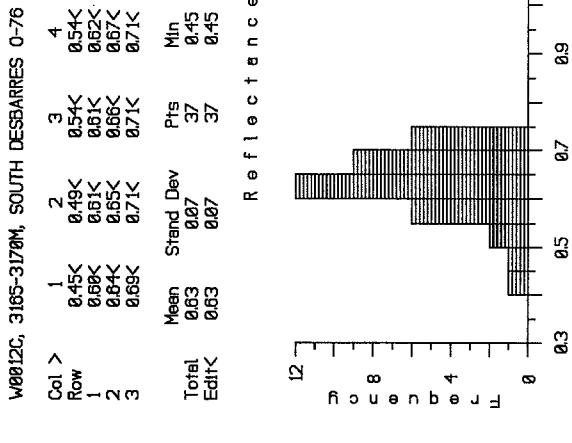
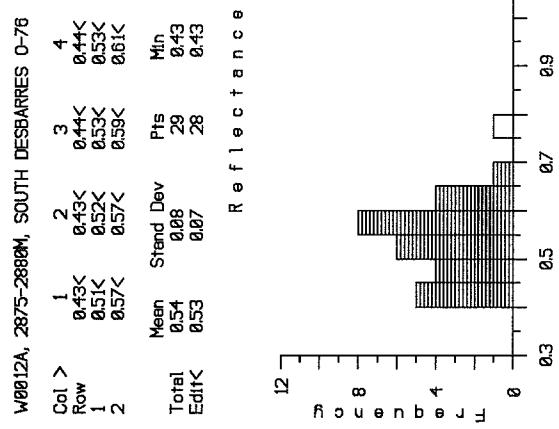
W0010B, 2110-2115M, SOUTH DESBARRES 0-76

Col >	1	2	3	4	5	6	7	8	9	0	0.32<	0.34<
Row 1	0.29<	0.30<	0.32<	0.38<	0.40<	0.41<	0.41<	0.41<	0.41<	0.41<		
Total	Mean 0.35	Stand Dev 0.04	Pts 14	Min 0.07	Max 0.55	Sum 4.94						
Edit<	0.33	0.04	13	0.29	0.41	4.39						

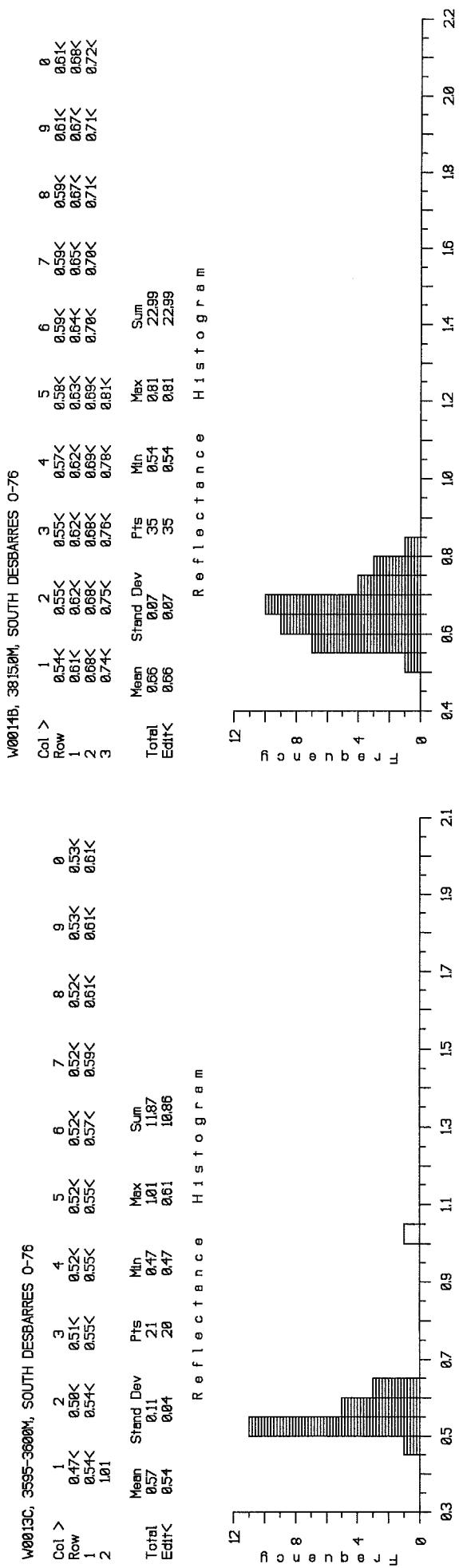
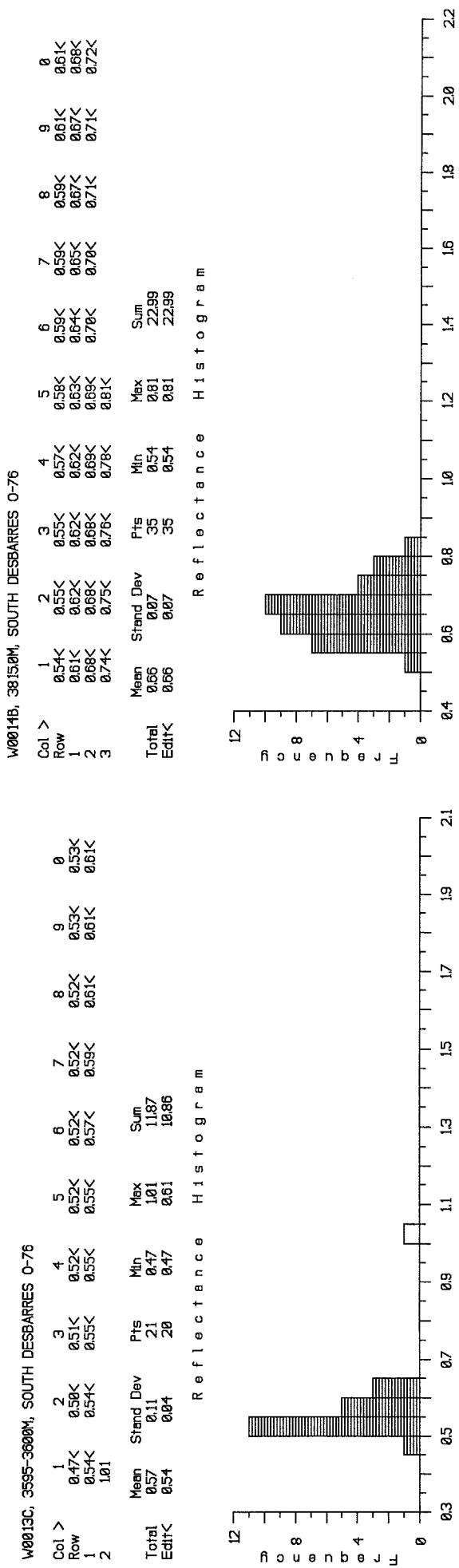
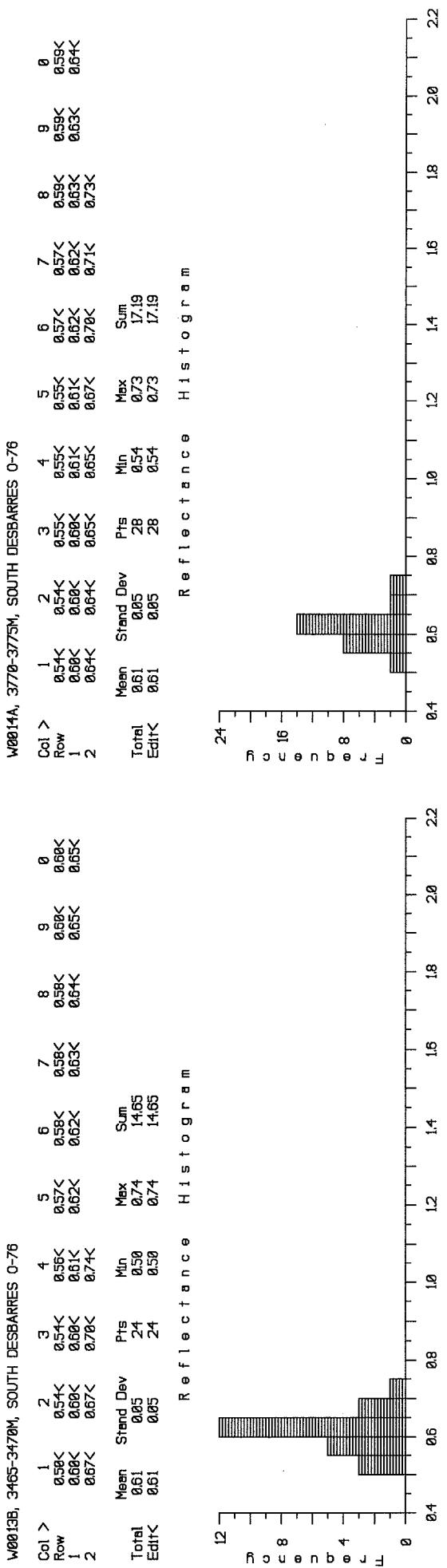
Reflection Histogram

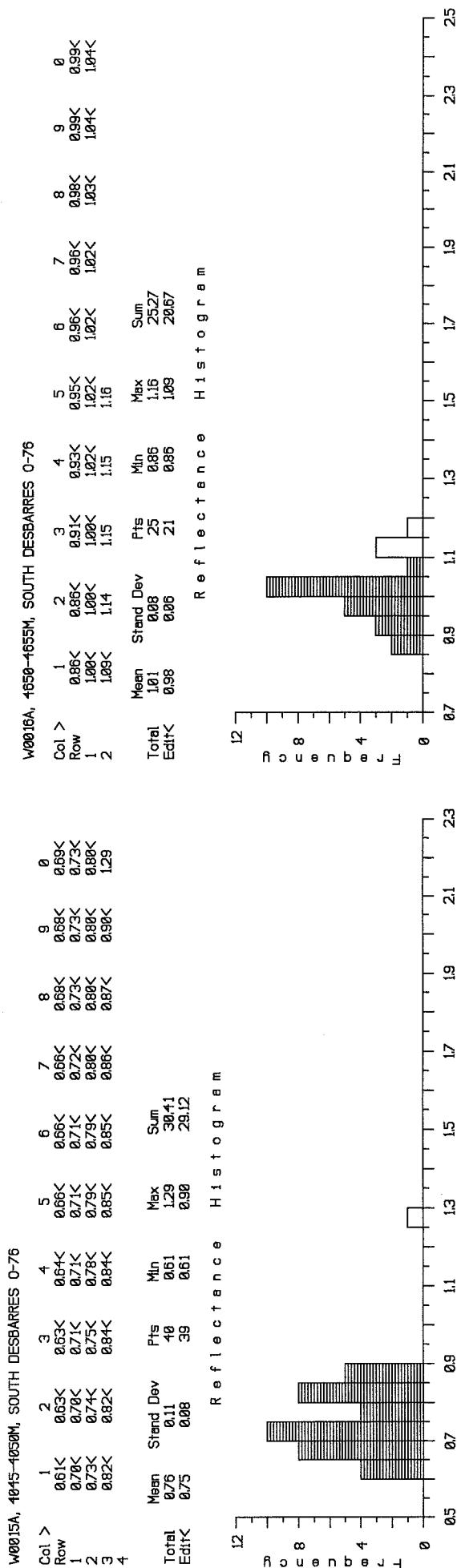
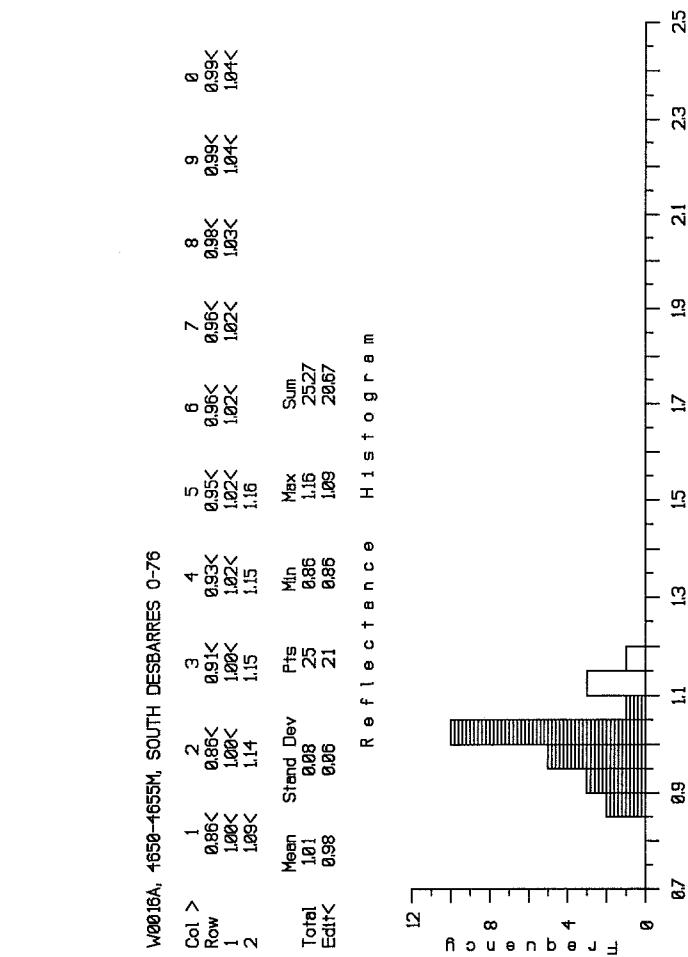
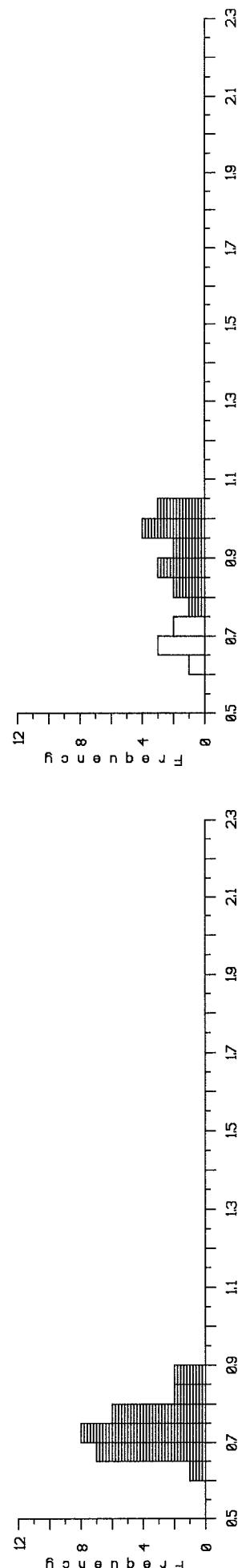
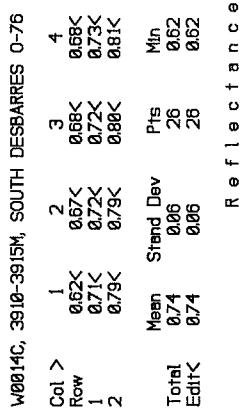


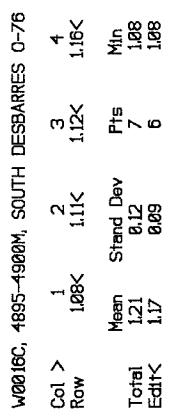
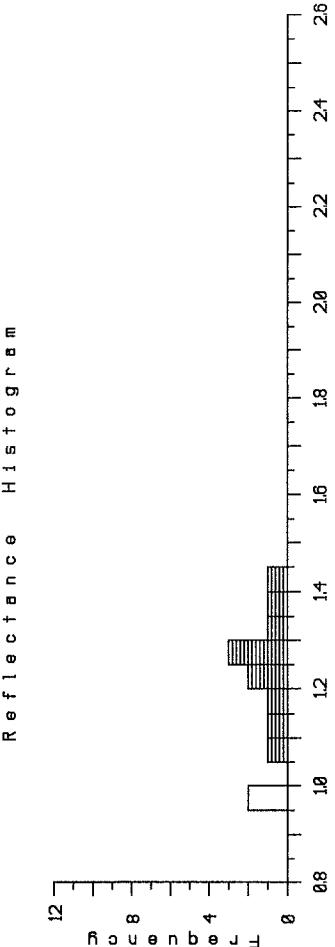
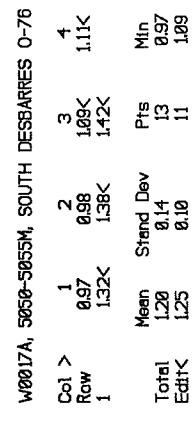
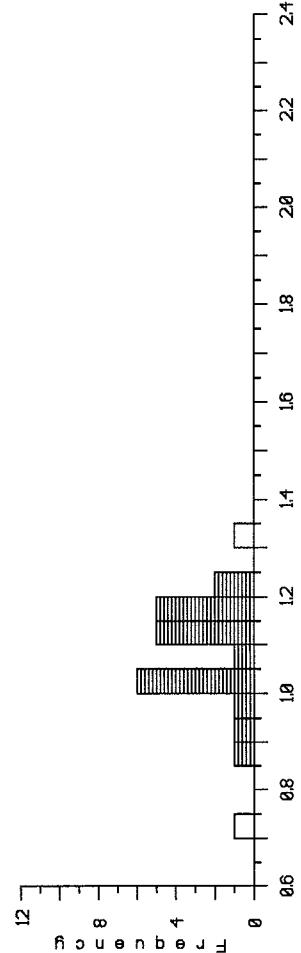
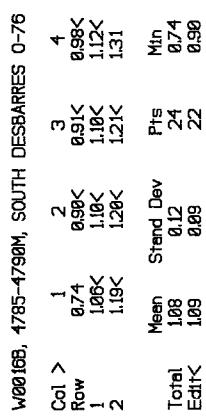




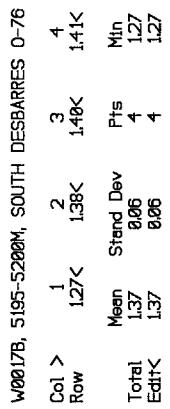
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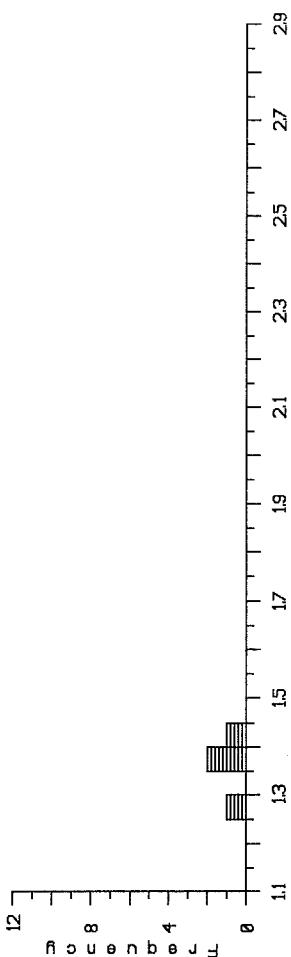




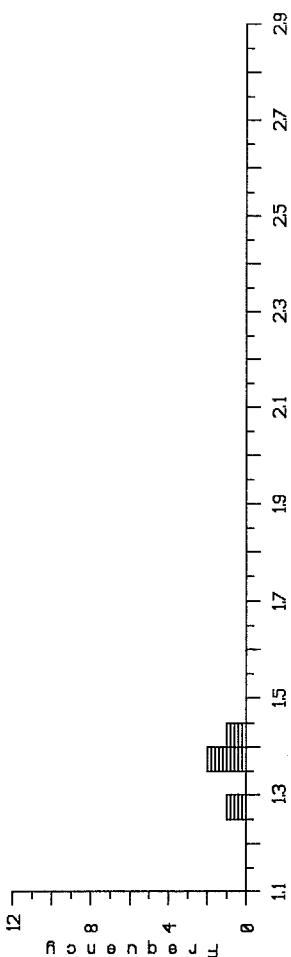
Reflection Histogram



Reflection Histogram



Reflection Histogram



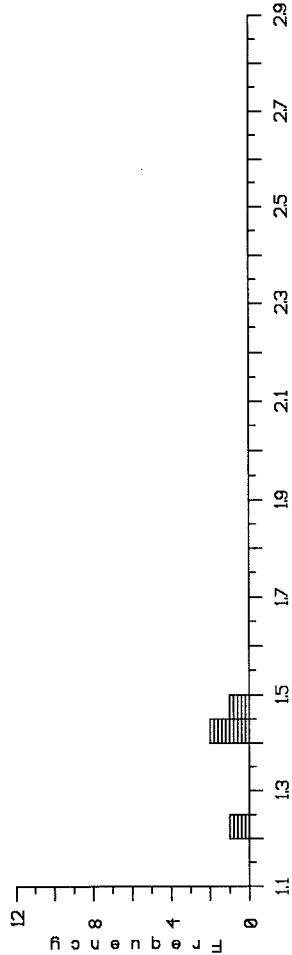
Reflection Histogram

Reflection Histogram

W0017C, S350-5555M, SOUTH DESBARRS 0-76

Col >	Row	1	2	3	4	5	6	7	8	9	0
Mean	1.24<	1.42<	1.43<	1.49<	1.49<	1.49<	1.49<	1.49<	1.49<	1.49<	1.49<
Total	1.39	0.11	4	4	124	149	149	149	149	149	149
Edit<	1.39	0.11	4	4	124	149	149	149	149	149	149

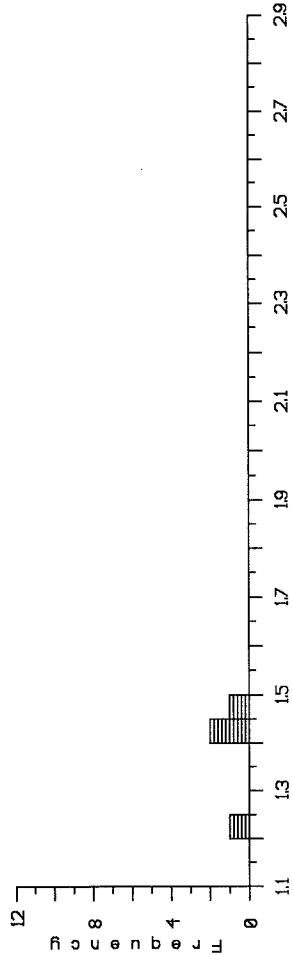
Reflection Histogram



W0019B, 5855-5860M, SOUTH DESBARRS 0-76

Col >	Row	1	2	3	4	5	6	7	8	9	0
Mean	1.47<	1.42<	1.43<	1.49<	1.49<	1.49<	1.49<	1.49<	1.49<	1.49<	1.49<
Total	1.69	0.16	4	4	124	149	149	149	149	149	149
Edit<	1.69	0.16	4	4	124	149	149	149	149	149	149

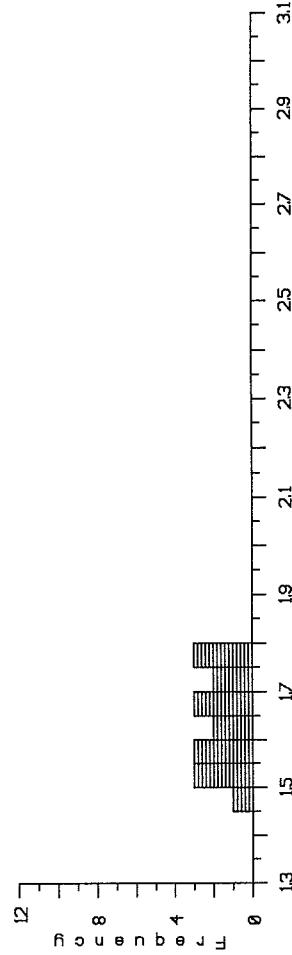
Reflection Histogram



W0019B, 5855-5860M, SOUTH DESBARRS 0-76

Col >	Row	1	2	3	4	5	6	7	8	9	0
Mean	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
Total	1.69	0.16	6	6	6	6	6	6	6	6	6
Edit<	1.69	0.16	6	6	6	6	6	6	6	6	6

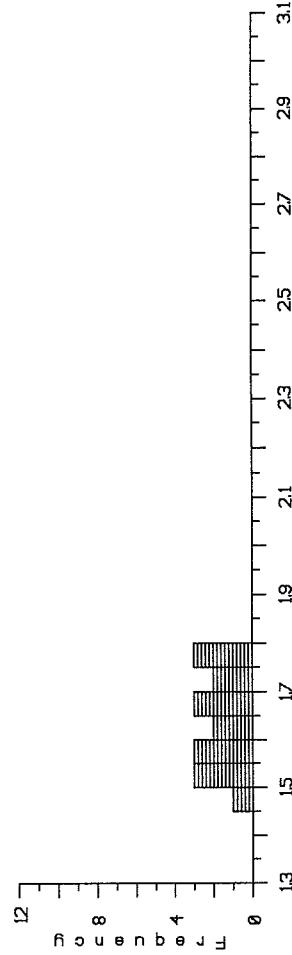
Reflection Histogram



W0018A, 5525-5510M, SOUTH DESBARRS 0-76

Col >	Row	1	2	3	4	5	6	7	8	9	0
Mean	1.45<	1.53<	1.53<	1.53<	1.58<	1.58<	1.58<	1.58<	1.58<	1.58<	1.58<
Total	1.68	1.68	1.68	1.68	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Edit<	1.68	1.68	1.68	1.68	1.72	1.72	1.72	1.72	1.72	1.72	1.72

Reflection Histogram



W0019C, 5957.0M, SOUTH DESBARRES 0-76

	Col >	1	2	3	4	5	6	7	8	9	θ
Row	2.10<	2.16<	2.22<	2.28<	2.32<	2.32<	2.34<	2.34<	2.38<	2.38<	
1	2.38<	2.39<	2.40<	2.41<	2.41<	2.45<	2.46<	2.47<	2.49<	2.50<	
2	2.50<	2.50<	2.50<	2.50<	2.50<	2.50<	2.50<	2.50<	2.50<	2.50<	
Total	2.38	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	
Edith	2.38	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	

Reflections Histogram

