VITRINITE REFLECTANCE DATA ON SIXTEEN WELLS FROM THE BASS BASIN

AMOCO Australia Petroleum Company

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AMOCO Australia Petroleum Company,
15 Blue Street,
NORTH SYDNEY   NSW   2060

Attention: P.D. Connard

REPORT F6117/85 (Final)

CLIENT REFERENCE: Letter of 23 November 1984. AUP-74-L-341-PDC

TITLE: Vitrinite reflectance data on sixteen
                           wells from the Bass Basin.

MATERIAL: Core, SWC and cuttings

LOCALITY: Bass Basin

DATE RECEIVED: 26 November 1984

WORK REQUIRED: Vitrinite reflectance determinations

Investigation and Report by: Brian L. Watson

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1. INTRODUCTION

Forty-five core, SWC and cuttings samples from sixteen exploration wells in the Bass Basin were received for vitrinite reflectance determinations. This report presents the results of this study.

2. ANALYTICAL PROCEDURE

Representative portions of each sample (crushed to -14+35 BSS mesh) were obtained with a sample splitter and then mounted in cold setting Glasscraft resin using a 2.5 cm diameter mould. Each block was ground flat using diamond impregnated laps and carborundum paper. The surface was then polished with aluminium oxide and finally magnesium oxide.

Reflectance measurements were made with a Leitz MPV1.1 microphotometer fitted to a Leitz Ortholux microscope and calibrated against synthetic standards. All measurements were taken using oil immersion (n = 1.518) and incident monochromatic light (wavelength 546 nm) at a temperature of 23±1°C.

3. RESULTS

The vitrinite reflectance data are summarised in Table 1. Histogram plots of these data are presented in Appendix 1. Vitrinite reflectance versus depth plots (Figs 1 and 2) are provided for Poonboon-1 and Dondu-1 Figure 3 is a composite depth-reflectance profile for the whole basin. Table 2 lists the proportion of exinite, and the major exinite macerals present, in the resinite-rich coal samples examined.

4. REFERENCES

COOK, A.C., 1982. Organic facies in the Eromanga Basin; In Moore, P.S. & Mount, T.J. (compilers) *Eromanga Basin Symposium*, summary papers. Geol. Soc. Aust. & Pet. Explor. Soc. Aust., Adelaide.

SNOWDON, L.R. and POWELL, T.G., 1982. Immature oil and condensate - modification of hydrocarbon generation model for terrestrial organic matter. *Bull. Am. Assoc. Petrol. Geol.*, 66, 775-788.

TABLE 1:   SUMMARY OF VITRINITE REFLECTANCE MEASUREMENTS, BASS BASIN

Depth (ft)	Mean Maximum Reflectance (%)	Standard Deviation	Range	Number of Determinations
AROO-1				
9527	0.68	0.05	0.55-0.76	32
BASS-1				
7709	0.54	0.05	0.44-0.68	29
7714	0.54	0.05	0.46-0.65	31
BASS-3				
7433	0.50	0.02	0.47-0.57	26
7443	0.46	0.04	0.40-0.54	8
CORMORANT-1				
7914	-	-	-	-
8683	-	-	-	-
9099	0.79	0.07	0.65-0.91	21
9103	0.81	0.05	0.68-0.89	33
DONDU-1				
7680	0.49	0.05	0.39-0.59	19
7681	0.50	0.04	0.44-0.58	16
7685	0.50	0.04	0.43-0.61	27
7686	0.51	0.04	0.45-0.62	19
9133	0.93	0.07	0.73-1.04	34
NANGKERO-1				
7414	0.50	0.06	0.37-0.61	31
7415	0.51	0.05	0.42-0.62	28
NARIMBA-1				
10294	0.71	0.06	0.56-0.86	26
10704	0.78	0.09	0.57-0.94	31
10770	0.79	0.06	0.66-0.96	29
10798	0.78	0.10	0.68-0.92	7
PELICAN-1				
8542	0.69	0.04	0.61-0.77	33
10392	0.86	0.07	0.70-0.96	34
10397	0.81	0.07	0.81-1.04	33
PELICAN-2				
9786	0.80	0.04	0.72-0.87	25
9809	0.81	0.09	0.60-0.96	32
9911	0.82	0.06	0.67-0.91	29
9917	0.81	0.05	0.72-0.95	32

Continued

TABLE 1: Continued

Depth (ft)	Mean Maximum Reflectance (%)	Standard Deviation	Range	Number of Determinations
PELICAN-3				
9489	0.67	0.06	0.58-0.76	9
9514	0.71	0.04	0.64-0.78	11
PELICAN-4				
9569	0.75	0.06	0.65-0.84	26
9570	0.73	0.06	0.63-0.84	33
PIPIPA-1				
6375	1.48	0.10	1.23-1.62	28
POONBOON-1				
8113	0.63	0.04	0.56-0.72	31
8115	0.64	0.04	0.58-0.75	31
9976	0.71	0.05	0.60-0.80	28
9982	0.69	0.06	0.58-0.79	24
10693	0.73	0.04	0.65-0.79	18
10694	0.70	0.04	0.62-0.76	18
10712	0.72	0.08	0.60-0.84	17
TAROOK-1A				
9094	0.68	0.06	0.59-0.83	34
9095	0.72	0.04	0.61-0.78	36
TOOLKA-1				
8100-8240	0.68	0.05	0.60-0.77	16
YURONGI-1				
7705	0.53	0.05	0.38-0.63	32
7803	0.57	0.06	0.47-0.69	33
7935	0.57	0.05	0.47-0.65	13

TABLE 2: EXINITE CONTENTS AND MAJOR EXINITE MACERALS IN
RESINITE-RICH COAL SAMPLES, BASS BASIN*

Well	Depth (ft)	Proportion of exinite	Major Exinite
Bass-1	7714	up to 10%	res, sub
Nangkero-1	7414	up to 15%	res, sub
	7415	up to 15%	res, sub
Pelican-1	8542	up to 20%	sp, res
Pelican-4	9569	up to 10%	sp, res, exs
	9570	up to 30%	res, sp, exs
Tarook-1A	9094	up to 20%	sp, exs
	9095	up to 30%	sp, res, sub, exs

*Resinite and suberinite are thermally labile exinites which
have the potential to generate liquid hydrocarbons at maturation
levels as low as VR ∿0.45% (Snowdon and Powell, 1982; Cook, 1982).

KEY TO DISPERSED ORGANIC MATTER DESCRIPTIONS

MACERAL GROUPS

V	Vitrinite
I	Inertinite
E	Exinite

EXINITE MACERALS

spo	Sporinite
cut	Cutinite
res	Resinite
sub	Suberinite
lipto	Liptodetrinite
fluor	Fluorinite
exs	Exsudatinite
phyto	Phytoplankton
tela	Telalginite
lama	Lamalginite
bmite	Bituminite
bmen	Bitumen
thuc	Thucholite

ABUNDANCE (by vol.)

Ma	Major	>15%
Ab	Abundant	2-15%
Co	Common	1-2%
Sp	Sparse	0.5-1%
Ra	Rare	0.1-0.5%
Vr	Very Rare	∿0.1%
Tr	Trace	<0.1%

FLUORESCENCE COLOUR AND INTENSITY

G	Green		i	Intense
Y	Yellow		m	Moderate
O	Orange		d	Dull
B	Brown			

FIGURE 1

146009

VITRINITE REFLECTANCE PROFILE, DONDU #1

Vitrinite reflectance profile plotting DEPTH (5000 to 10000) on the vertical axis against VITRINITE REFLECTANCE (%) (0.3 to 1.1) on the horizontal axis. A cluster of data points appears near 0.5% at approximately 7700 ft depth, and a single point (+) appears near 0.93% at approximately 9150 ft depth.

5 cm

FIGURE 2
146010
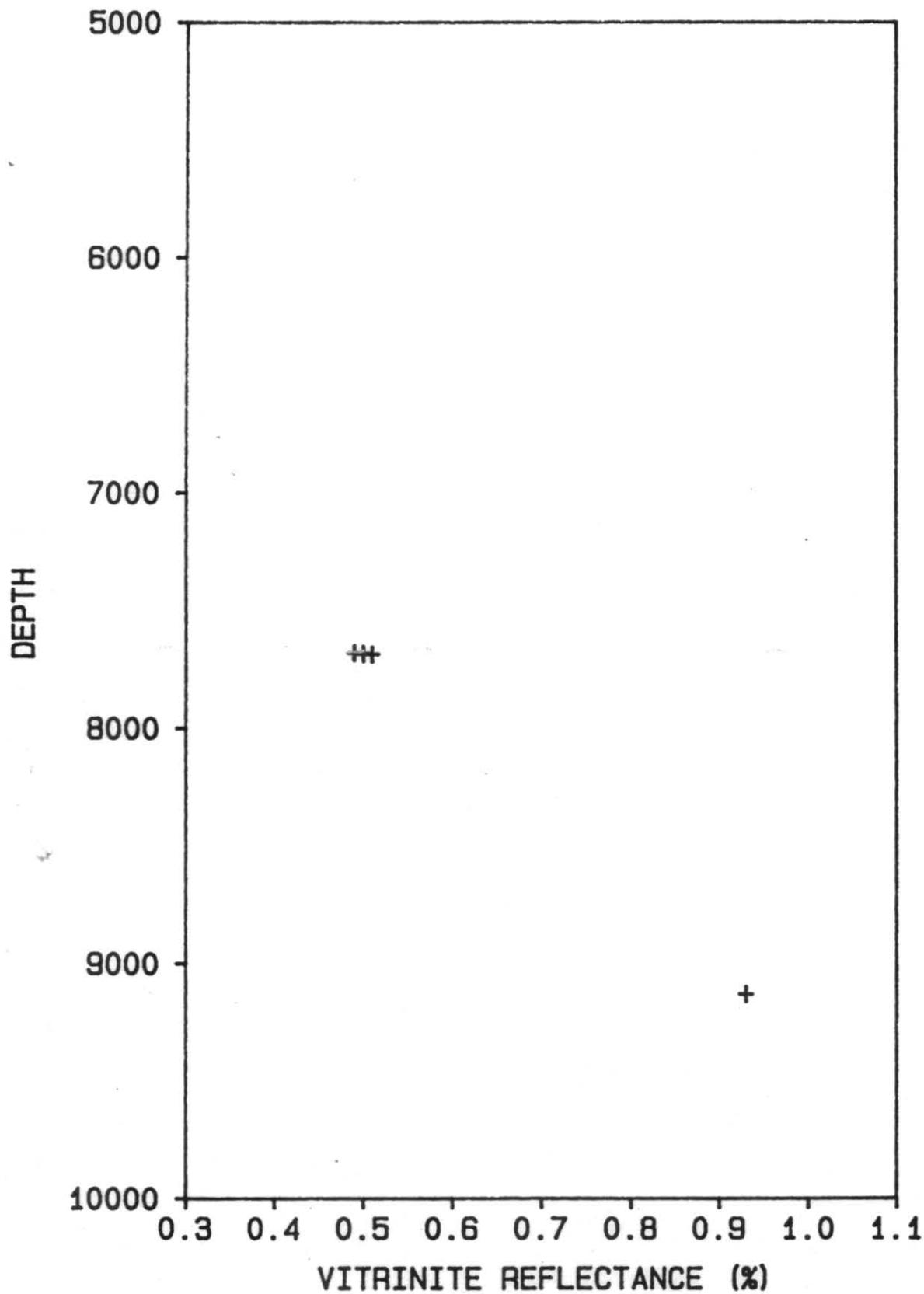
VITRINITE REFLECTANCE PROFILE, POONBOON #1

5 cm

FIGURE 3
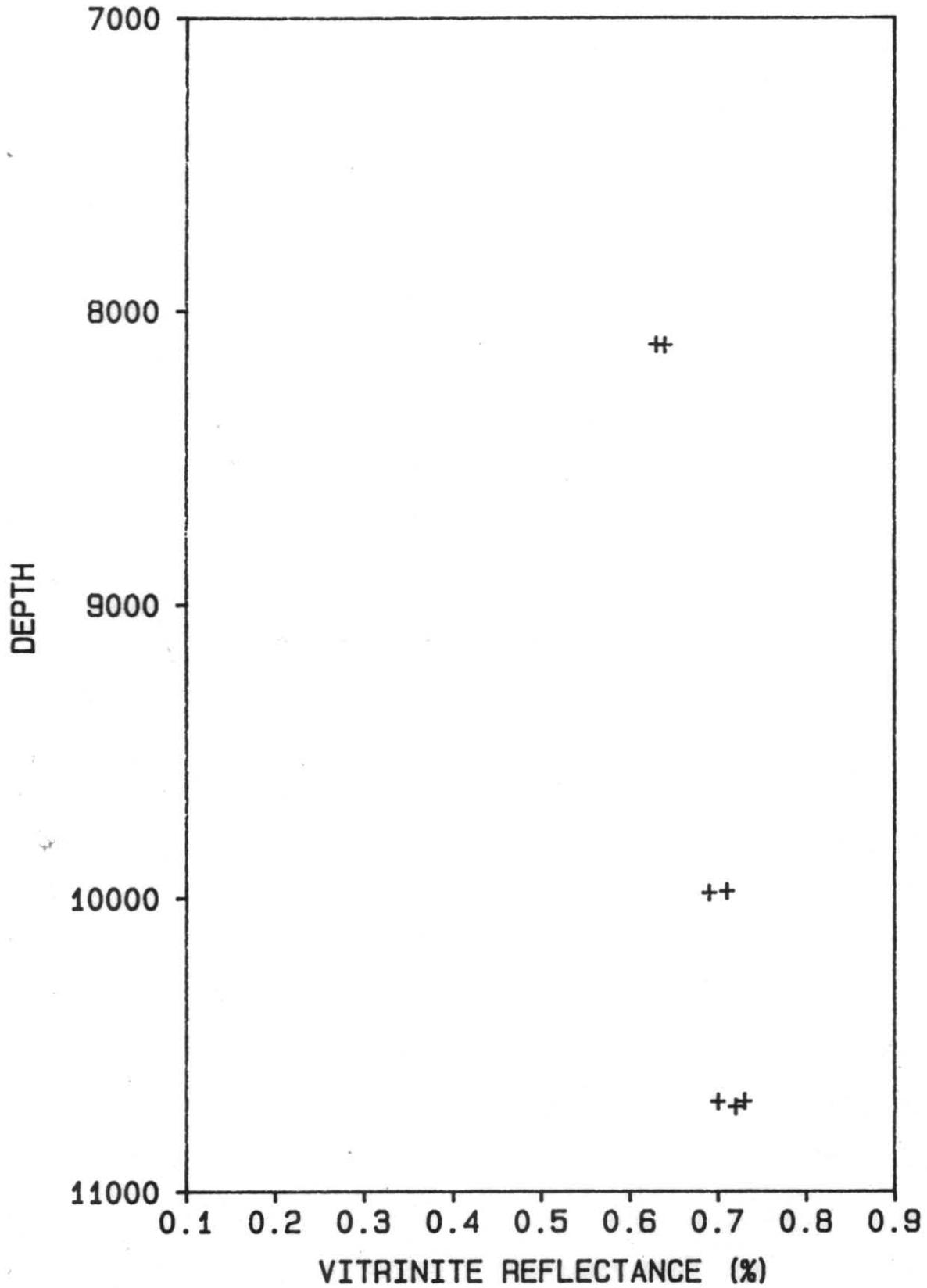
VITRINITE REFLECTANCE PROFILE, BASS BASIN

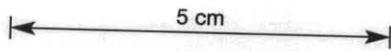DEPTH (Feet)

VITRINITE REFLECTANCE (%)
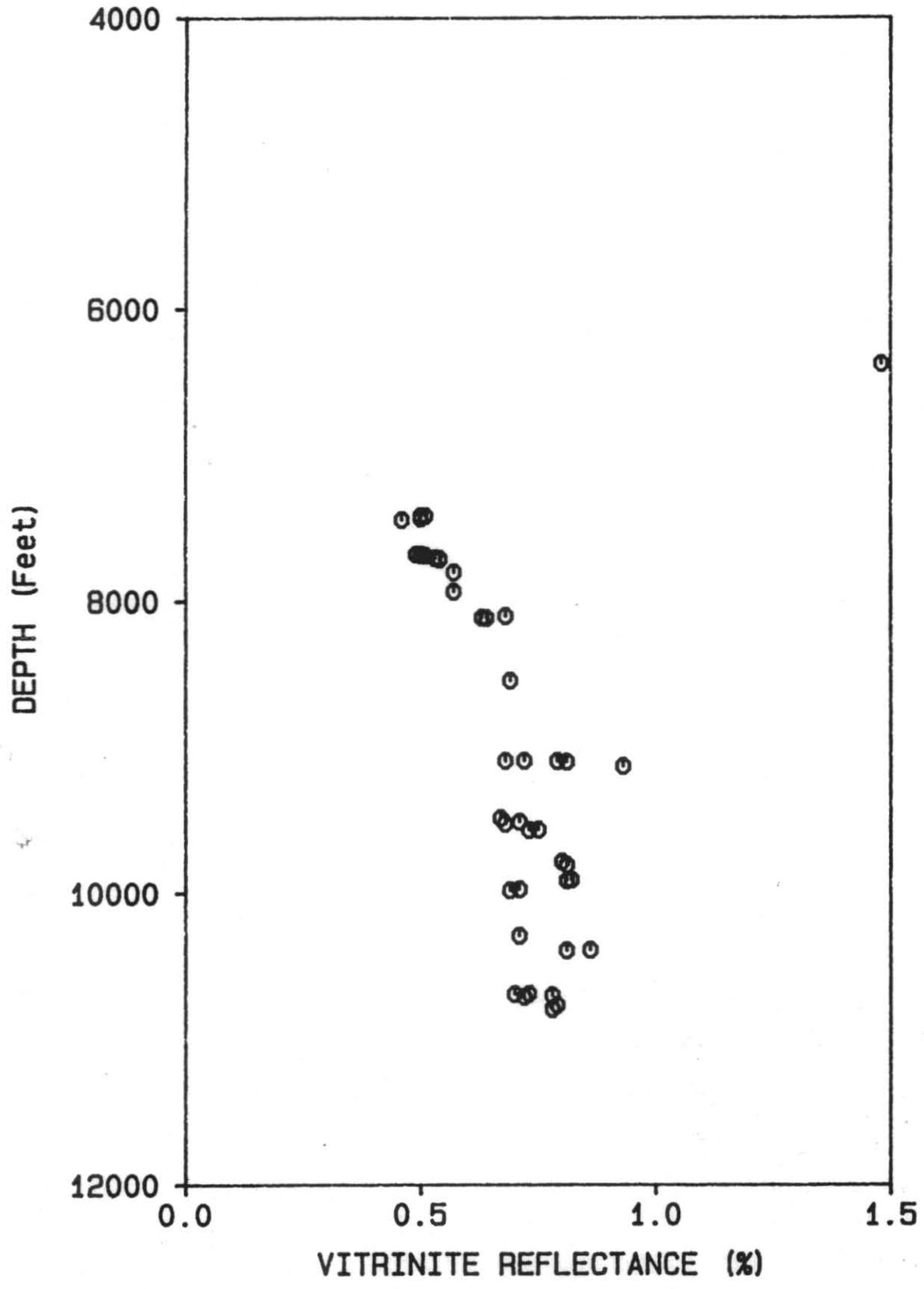
5 cm

APPENDIX 1

HISTOGRAM PLOTS OF VITRINITE REFLECTANCE DATA, BASS BASIN

AROO—1

9527 FT

SORTED LIST
```
.55   .58   .59   .6   .6   .62   .63   .65   .66   .66
.66   .67   .67   .67   .68   .69   .69   .7   .71   .71
.72   .72   .72   .72   .72   .73   .73   .73   .74   .74
.74   .76
```
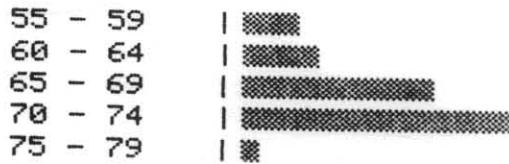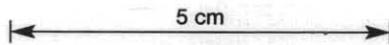Number of values= 32

MEAN OF VALUES .68
STD DEVIATION .053

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
55 - 59    | ▦▦▦
60 - 64    | ▦▦▦
65 - 69    | ▦▦▦▦▦▦▦▦
70 - 74    | ▦▦▦▦▦▦▦▦▦▦▦
75 - 79    | ▦
```

BASS-1

7709 FT

```
SORTED LIST
.44   .45   .46   .48   .49   .49   .49   .49   .5   .51
.52   .52   .52   .52   .53   .53   .53   .55   .57   .57
.57   .58   .58   .58   .59   .6   .6   .62   .68
Number of values= 29
```

MEAN OF VALUES .537
STD DEVIATION .054

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
44 - 48    | ████████
49 - 53    | ████████████████████████████
54 - 58    | ██████████████
59 - 63    | ████████
64 - 68    | ██
```

5 cm

BASS-1

7714 FT

SORTED LIST
```
.46   .48   .49   .49   .49   .49   .49   .49   .49   .5
.5   .51   .51   .52   .52   .52   .53   .54   .54   .55
.55   .56   .56   .57   .57   .59   .59   .6   .6   .63
.65
```
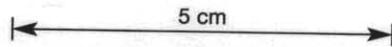Number of values= 31

MEAN OF VALUES   .535
STD DEVIATION   .047

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
46 - 48    | ▨
49 - 51    | ▨▨▨▨▨▨▨▨▨
52 - 54    | ▨▨▨▨
55 - 57    | ▨▨▨▨
58 - 60    | ▨▨▨
61 - 63    | ▨
64 - 66    | ▨
```

BASS-3

7433 FT

SORTED LIST
```
.47   .47   .47   .48   .48   .48   .49   .49   .49   .49
.49   .49   .49   .5   .5   .5   .51   .51   .52   .52
.52   .52   .53   .53   .53   .57
```
Number of values= 26

MEAN OF VALUES   .502
STD DEVIATION   .023

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
47 - 49    | ████████████████████
50 - 52    | ██████████████
53 - 55    | ██████
56 - 58    | █
```
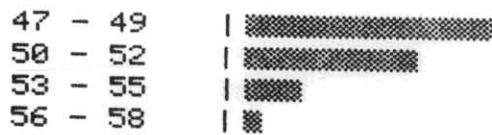
BASS-3

7443 FT

SORTED LIST
.4 .42 .43 .46 .47 .48 .51 .53
Number of values= 8

MEAN OF VALUES .463
STD DEVIATION .042

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
40 - 42    | ▒▒▒
43 - 45    | ▒
46 - 48    | ▒▒▒▒
49 - 51    | ▒
52 - 54    | ▒
```

CORMORANT-1

9099 FT

SORTED LIST
.65 .73 .73 .74 .74 .75 .75 .76 .76 .78
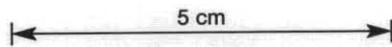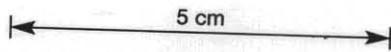.78 .79 .79 .8 .83 .85 .86 .88 .89 .89
.91
Number of values= 21

MEAN OF VALUES .793
STD DEVIATION .065

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
65 - 69    | ▨
70 - 74    | ▨▨▨▨▨
75 - 79    | ▨▨▨▨▨▨▨▨
80 - 84    | ▨▨
85 - 89    | ▨▨▨▨
90 - 94    | ▨
```

CORMORANT-1

9103 FT

SORTED LIST
```
.68   .7   .72   .73   .73   .74   .76   .76   .78   .79
.79   .8   .8    .81   .81   .81   .81   .82   .82   .83
.83   .84  .84   .84   .84   .85   .85   .86   .87   .87
.88   .88  .89
```
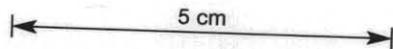Number of values= 33

MEAN OF VALUES .807
STD DEVIATION .054

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
68 - 72    | ███
73 - 77    | ██████
78 - 82    | ███████████
83 - 87    | ███████████
88 - 92    | ███
```

DONDU-1

7680 FT

SORTED LIST
.39 .42 .44 .45 .47 .47 .48 .48 .48 .48
.48 .51 .51 .52 .53 .53 .53 .55 .59
Number of values= 19

MEAN OF VALUES .49
STD DEVIATION .046

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
39 - 41    | ▨
42 - 44    | ▧▧
45 - 47    | ▧▧▧
48 - 50    | ▧▧▧▧▧▧
51 - 53    | ▧▧▧▧▧▧▧
54 - 56    | ▨
57 - 59    | ▨
```
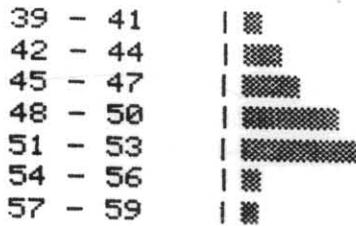
DONDU-1

7681 FT

SORTED LIST
```
.44   .45   .45   .46   .47   .48   .48   .51   .51   .52
.53   .53   .53   .55   .56   .58
```
Number of values= 16

MEAN OF VALUES .503
STD DEVIATION .041

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
44 - 46    | ▓▓▓▓▓
47 - 49    | ▓▓▓▓
50 - 52    | ▓▓▓
53 - 55    | ▓▓▓▓
56 - 58    | ▓
```

DONDU—1

7685 FT

SORTED LIST

```
.43   .44   .44   .45   .45   .45   .46   .47   .47   .49
.49   .5   .5   .5   .51   .51   .51   .51   .52   .52
.52   .53   .53   .54   .55   .55   .61
```

Number of values= 27

MEAN OF VALUES .498
STD DEVIATION .041

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
43 - 47     |████████████
48 - 52     |██████████████████
53 - 57     |████████
58 - 62     |█
```

DONDU-1

7686 FT

SORTED LIST

```
.45   .45   .45   .47   .48   .49   .49   .5   .5   .5
.51   .51   .51   .52   .53   .53   .55   .56   .62
Number of values= 19
```
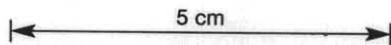
MEAN OF VALUES   .506
STD DEVIATION   .041

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
45 - 47      | ▓▓▓▓▓
48 - 50      | ▓▓▓▓▓▓▓
51 - 53      | ▓▓▓▓▓▓
54 - 56      | ▓▓
57 - 59      |
60 - 62      | ▓
```

DONDU-1
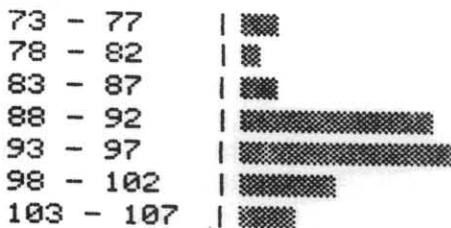
9133 FT

SORTED LIST
```
.73  .77  .81  .85  .87  .88  .89  .89  .89  .89
.9  .9  .9  .91  .91  .93  .93  .93  .93  .93
.94  .94  .95  .96  .97  .97  .99  .99  1  1
1  1.03  1.04  1.04
```
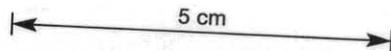Number of values= 34

MEAN OF VALUES   .925
STD DEVIATION   .069

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
73 - 77    | ▓▓▓
78 - 82    | ▓
83 - 87    | ▓▓▓
88 - 92    | ▓▓▓▓▓▓▓▓▓▓▓▓▓
93 - 97    | ▓▓▓▓▓▓▓▓▓▓▓▓▓▓
98 - 102   | ▓▓▓▓▓▓
103 - 107  | ▓▓▓
```

NANGKERO-1

7414 FT

SORTED LIST
```
.37   .41   .43   .44   .45   .45   .46   .46   .46   .46
.47   .47   .48   .48   .48   .5    .51   .51   .52   .52
.52   .52   .53   .53   .53   .54   .56   .58   .58   .6
.61
```
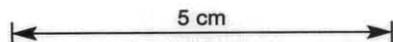Number of values= 31

MEAN OF VALUES .498
STD DEVIATION .055

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
37 - 41    | ███
42 - 46    | █████████
47 - 51    | █████████
52 - 56    | ███████████
57 - 61    | ████
```

5 cm

NANGKERO-1

7415 FT

SORTED LIST
```
.42   .45   .46   .47   .47   .47   .48   .48   .48   .48
.48   .49   .5   .5   .5   .51   .51   .51   .51   .52
.54   .54   .55   .56   .56   .57   .62   .62
```
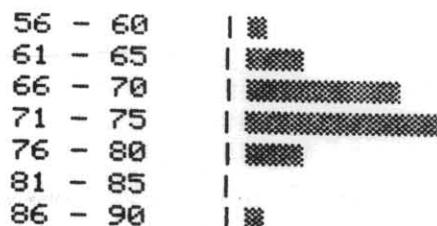Number of values= 28

MEAN OF VALUES .509
STD DEVIATION .046

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
42 - 46    |▓▓▓▓
47 - 51    |▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓
52 - 56    |▓▓▓▓▓▓
57 - 61    |▓
62 - 66    |▓▓
```

NARIMBA-1

10294 FT

SORTED LIST
```
.56   .61   .64   .64   .67   .67   .67   .67   .67   .69
.69   .7   .71   .72   .72   .73   .73   .74   .74   .74
.75   .75   .76   .77   .8   .86
```
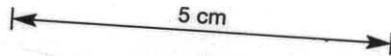Number of values= 26

MEAN OF VALUES .708
STD DEVIATION .06

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
56 - 60    | ▓
61 - 65    | ▓▓▓
66 - 70    | ▓▓▓▓▓▓▓
71 - 75    | ▓▓▓▓▓▓▓▓▓
76 - 80    | ▓▓▓
81 - 85    |
86 - 90    | ▓
```

NARIMBA-1

10704 FT

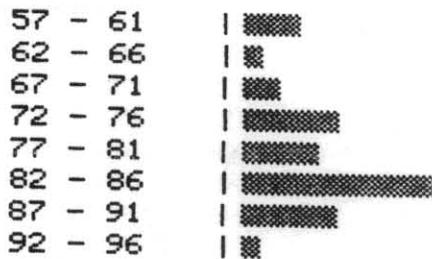SORTED LIST
```
.57  .61  .61  .63  .67  .71  .72  .73  .73  .74
.76  .77  .78  .79  .8  .82  .82  .83  .83  .84
.84  .84  .84  .84  .86  .87  .87  .88  .88  .89
.94
```
Number of values= 31

MEAN OF VALUES .784
STD DEVIATION .091

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
57 - 61    | ▓▓▓▓
62 - 66    | ▓
67 - 71    | ▓▓
72 - 76    | ▓▓▓▓▓
77 - 81    | ▓▓▓▓
82 - 86    | ▓▓▓▓▓▓▓▓▓
87 - 91    | ▓▓▓▓▓
92 - 96    | ▓
```

5 cm

NARIMBA-1

10770 FT

SORTED LIST
```
.66  .73  .74  .74  .74  .74  .74  .75  .75  .76
.76  .76  .78  .79  .79  .79  .8  .81  .81  .82
.82  .83  .83  .84  .85  .86  .86  .9  .96
```
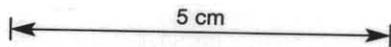Number of values= 29

MEAN OF VALUES .793
STD DEVIATION .059

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
66 - 70     | ▓
71 - 75     | ▓▓▓▓▓▓▓▓▓
76 - 80     | ▓▓▓▓▓▓▓▓▓
81 - 85     | ▓▓▓▓▓▓▓▓▓
86 - 90     | ▓▓▓▓
91 - 95     |
96 - 100    | ▓
```

NARIMBA-1

10798 FT

SORTED LIST
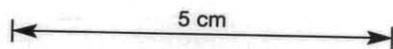.68 .68 .7 .72 .87 .89 .92
Number of values= 7

MEAN OF VALUES .78
STD DEVIATION .1

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
68 - 72    | ▓▓▓▓▓
73 - 77    |
78 - 82    |
83 - 87    | ▓
88 - 92    | ▓▓
```

PELICAN-1

8542 FT

SORTED LIST
```
.61   .63   .63   .63   .65   .65   .65   .66   .66   .66
.66   .66   .66   .67   .68   .69   .69   .7    .7    .7
.7    .71   .71   .71   .72   .73   .75   .75   .75   .75
.75   .76   .77
```
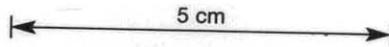Number of values= 33

MEAN OF VALUES   .691
STD DEVIATION   .043

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
61 - 65    | ▨▨▨▨▨▨
66 - 70    | ▨▨▨▨▨▨▨▨▨▨▨▨▨▨
71 - 75    | ▨▨▨▨▨▨▨▨▨▨▨
76 - 80    | ▨▨
```

PELICAN-1

10395 FT

SORTED LIST
```
.7   .73   .76   .77   .79   .8   .8   .8   .81   .82
.83   .84   .84   .85   .86   .87   .88   .89   .89   .89
.9   .9   .9   .9   .9   .91   .92   .92   .93   .94
.94   .95   .95   .96
```
Number of values= 34

MEAN OF VALUES   .863
STD DEVIATION   .066

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
70 - 74     | ███
75 - 79     | ████
80 - 84     | ██████████
85 - 89     | █████████
90 - 94     | ████████████
95 - 99     | ███
```

PELICAN-1

10397 FT

SORTED LIST
```
.81   .81   .82   .83   .84   .84   .84   .84   .86   .86
.86   .87   .87   .9    .9    .91   .91   .92   .92   .92
.94   .95   .95   .96   .96   .96   .96   .98   .98   1.01
1.02  1.02  1.04
```
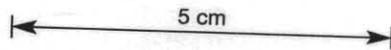Number of values= 33

MEAN OF VALUES   .911
STD DEVIATION   .065

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
81 - 85    | ████████████
86 - 90    | ██████████
91 - 95    | ████████████
96 - 100   | █████████
101 - 105  | ██████
```

PELICAN-2
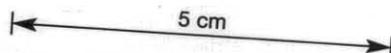
9786 FT

SORTED LIST
```
.72  .74  .75  .76  .76  .77  .77  .78  .79  .79
.8  .8  .8  .8  .8  .81  .81  .82  .82  .84
.85  .86  .86  .86  .87
Number of values= 25
```

MEAN OF VALUES .801
STD DEVIATION .039

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
72 - 76   | ▨▨▨▨▨
77 - 81   | ▨▨▨▨▨▨▨▨▨▨▨
82 - 86   | ▨▨▨▨▨
87 - 91   | ▨
```

PELICAN-2

9809 FT

SORTED LIST
```
.6   .65   .68   .68   .7  .7   .72   .72   .72   .73
.77  .79   .81   .81   .82   .85   .85   .85   .86   .86
.86  .86   .88   .89   .89   .89   .9   .9   .9   .93
.94  .96
```
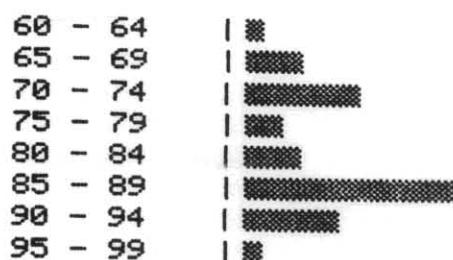Number of values= 32

MEAN OF VALUES .812
STD DEVIATION .093

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
60 - 64      | ▓
65 - 69      | ▓▓▓▓
70 - 74      | ▓▓▓▓▓▓▓▓
75 - 79      | ▓▓
80 - 84      | ▓▓
85 - 89      | ▓▓▓▓▓▓▓▓▓▓▓▓▓
90 - 94      | ▓▓▓▓▓
95 - 99      | ▓
```

5 cm

PELICAN-2

9911 FT

SORTED LIST

```
.67   .72   .73   .75   .76   .78   .79   .79   .79   .79
.79   .8   .81   .81   .82   .83   .83   .83   .83   .85
.85   .86   .87   .87   .88   .88   .88   .89   .91
```
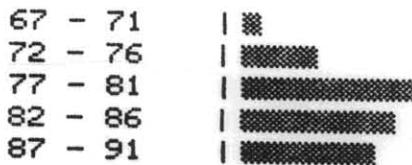
Number of values= 29

MEAN OF VALUES   .816
STD DEVIATION   .055

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
67 - 71      | ▓
72 - 76      | �
77 - 81      | ███████████████
82 - 86      | ████████████
87 - 91      | ██████████
```

PELICAN-2

9917 FT

```
 SORTED LIST
.72  .74  .75  .76  .76  .77  .77  .77  .77  .77
.78  .79  .79  .79  .79  .79  .8   .8   .8   .81
.82  .83  .83  .83  .84  .84  .84  .85  .86  .86
.93  .95
Number of values= 32
```

MEAN OF VALUES .806
STD DEVIATION .049

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
72 - 76    | ▓▓▓▓▓
77 - 81    | ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓
82 - 86    | ▓▓▓▓▓▓▓▓▓▓
87 - 91    |
92 - 96    | ▓
```

5 cm

PELICAN-3

9489 FT

SORTED LIST
.58 .6 .61 .63 .67 .69 .71 .75 .76
Number of values= 9

MEAN OF VALUES .667
STD DEVIATION .062

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
58 - 62    | ▨▨▨▨
63 - 67    | ▨▨
68 - 72    | ▨▨
73 - 77    | ▨▨
```

PELICAN-3

9514 FT

SORTED LIST
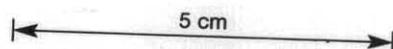.64 .66 .67 .69 .69 .7 .74 .74 .75 .75
.78
Number of values= 11

MEAN OF VALUES .71
STD DEVIATION .042

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
64 - 68    | ▓▓▓▓
69 - 73    | ▓▓▓▓
74 - 78    | ▓▓▓▓▓▓▓
```

5 cm

PELICAN-4

9569 FT

SORTED LIST
.65 .67 .67 .67 .68 .7 .71 .72 .72 .73
.73 .73 .74 .75 .75 .76 .78 .79 .79 .8
.8 .81 .82 .82 .83 .84
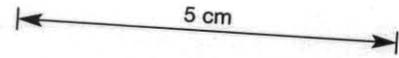Number of values= 26

MEAN OF VALUES .748
STD DEVIATION .055

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
65 - 69    | ████████
70 - 74    | ██████████
75 - 79    | ███████
80 - 84    | ████████
```

PELICAN-4

9570 FT

SORTED LIST
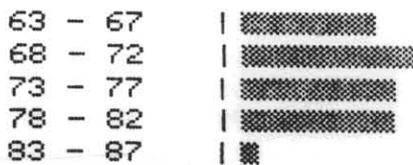.63   .64   .64   .66   .66   .67   .67   .68   .69   .69
.7   .7   .7   .71   .72   .72   .73   .75   .75   .75
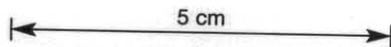.75   .76   .76   .76   .78   .78   .79   .8   .8   .8
.8   .82   .84
Number of values= 33

MEAN OF VALUES   .73
STD DEVIATION   .056

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
63 - 67      | ▓▓▓▓▓▓▓▓▓▓
68 - 72      | ▓▓▓▓▓▓▓▓▓▓▓▓▓
73 - 77      | ▓▓▓▓▓▓▓▓▓▓
78 - 82      | ▓▓▓▓▓▓▓▓▓▓
83 - 87      | ▓
```

5 cm

PIPIPA-1

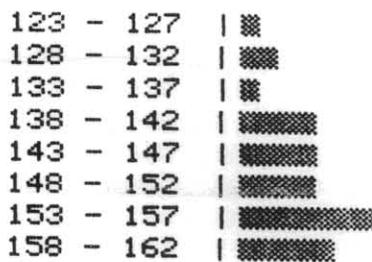1943.9 M

SORTED LIST
```
1.23  1.3   1.31  1.36  1.39  1.4   1.4   1.41  1.43  1.44
1.45  1.47  1.48  1.5   1.51  1.52  1.53  1.54  1.54  1.56
1.56  1.56  1.57  1.58  1.58  1.59  1.6   1.62
```
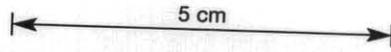Number of values= 28

MEAN OF VALUES 1.48
STD DEVIATION .099

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
123 - 127  | ▓
128 - 132  | ▓▓
133 - 137  | ▓
138 - 142  | ▓▓▓▓▓
143 - 147  | ▓▓▓▓▓
148 - 152  | ▓▓▓▓▓
153 - 157  | ▓▓▓▓▓▓▓▓
158 - 162  | ▓▓▓▓▓▓
```

5 cm

POONBOON—1

8113 FT

SORTED LIST
```
.56   .57   .57   .58   .58   .59   .59   .6   .6   .6
.61   .62   .62   .62   .62   .62   .63   .63   .64   .64
.64   .64   .65   .65   .66   .66   .66   .67   .67   .67
.72
```
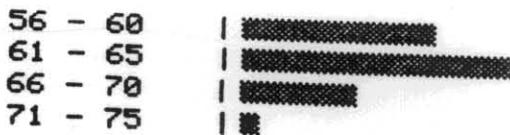Number of values= 31

MEAN OF VALUES   .625
STD DEVIATION   .036

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
56 - 60   |████████████
61 - 65   |██████████████████
66 - 70   |████████
71 - 75   |█
```

5 cm

POONBOON—1

8115 FT

SORTED LIST

```
.58    .58    .58    .59    .6    .6    .6    .61    .61    .62
.62    .62    .62    .62    .63    .63    .63    .64    .64    .65
.65    .65    .65    .65    .66    .67    .67    .68    .69    .7
.75
```
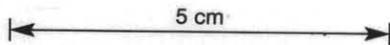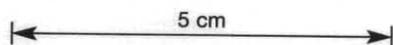
Number of values= 31

MEAN OF VALUES .635
STD DEVIATION .038

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
58 - 60    | ████████████
61 - 63    | ████████████████████
64 - 66    | ████████████████
67 - 69    | ████████
70 - 72    | █
73 - 75    | █
```

POONBOON-1

9976 FT

SORTED LIST

.6   .62 .62 .65 .65 .65 .66 .68 .69 .7
.7   .71 .71 .71 .72 .72 .73 .73 .73 .74
.74 .74 .75 .75 .77 .78 .78 .8
Number of values= 28

MEAN OF VALUES .708
STD DEVIATION .051

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
60 - 64    | ████
65 - 69    | ███████
70 - 74    | █████████████
75 - 79    | ████
80 - 84    | █
```

POONBOON—1

9982 FT

SORTED LIST
```
.58  .6  .61  .63  .63  .65  .65  .66  .66  .67
.67  .68  .69  .7  .71  .72  .72  .72  .74  .74
.75  .76  .77  .79
```
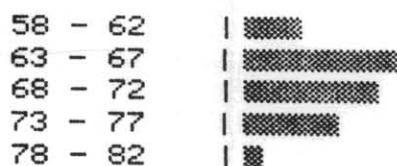Number of values= 24

MEAN OF VALUES .688
STD DEVIATION .055

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
58 - 62    | ▨▨▨
63 - 67    | ▨▨▨▨▨▨▨▨
68 - 72    | ▨▨▨▨▨▨▨
73 - 77    | ▨▨▨▨
78 - 82    | ▨
```

5 cm

POONBOON—1

10693 FT

SORTED LIST
.65   .67   .68   .69   .7   .7   .72   .72   .73   .73
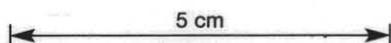.73   .74   .75   .75   .76   .77   .78   .79
Number of values= 18

MEAN OF VALUES   .726
STD DEVIATION   .037

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
65 - 69     |▓▓▓▓▓
70 - 74     |▓▓▓▓▓▓▓▓▓
75 - 79     |▓▓▓▓▓▓
```

POONBOON—1

10693 FT

5 cm

POONBOON-1

10694 FT

SORTED LIST
.62 .64 .65 .65 .66 .67 .67 .69 .7 .71
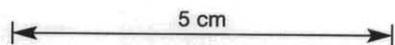.72 .72 .73 .73 .73 .75 .75 .76
Number of values= 18

MEAN OF VALUES .697
STD DEVIATION .041

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
62 - 66    | ▓▓▓▓▓▓
67 - 71    | ▓▓▓▓▓▓
72 - 76    | ▓▓▓▓▓▓▓▓
```

5 cm

POONBOON-1

10712 FT

```
 SORTED LIST
.6   .62   .64   .66   .66   .66   .66   .68   .69   .72
.78   .79   .8   .8   .8   .81   .84
Number of values= 17
```
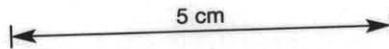
MEAN OF VALUES   .718
STD DEVIATION   .076

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
60 - 64      | ▓▓▓▓
65 - 69      | ▓▓▓▓▓▓▓▓
70 - 74      | ▓
75 - 79      | ▓▓▓
80 - 84      | ▓▓▓▓▓▓▓
```

5 cm

TARDOK-1A

9094 FT

```
 SORTED LIST
.59   .6   .61   .62   .62   .63   .63   .63   .63   .64
.64   .64   .65   .65   .65   .66   .66   .66   .67   .67
.68   .68   .69   .69   .69   .69   .71   .71   .71   .72
.78   .8   .83   .83
Number of values= 34
```
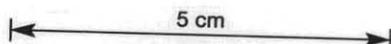
MEAN OF VALUES .675
STD DEVIATION .059

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
59 - 63     | ████████████
64 - 68     | ███████████████████
69 - 73     | ████████████
74 - 78     | █
79 - 83     | █████
```

TAROOK—1A

9095 FT

```
 SORTED LIST
.61   .64   .64   .65   .66   .66   .68   .7   .7   .71
.71   .71   .71   .72   .72   .72   .72   .73  .73  .73
.73   .73   .73   .73   .74   .74   .74   .74  .74  .74
.75   .75   .75   .76   .76   .78
Number of values= 36
```

```
MEAN OF VALUES  .716
STD DEVIATION   .038
```

```
    HISTOGRAM OF RESULTS
    Values are reflectance multiplied by 100
```

```
61 - 63    | ▨
64 - 66    | ▨▨▨▨▨▨▨
67 - 69    | ▨
70 - 72    | ▨▨▨▨▨▨▨▨▨▨▨
73 - 75    | ▨▨▨▨▨▨▨▨▨▨▨▨▨▨
76 - 78    | ▨▨▨
```
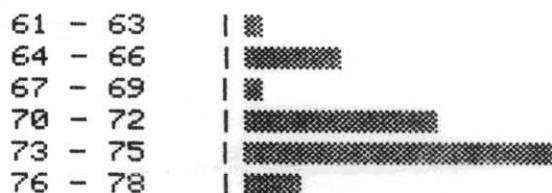
TOOLKA-1

8100-8240 FT

SORTED LIST
.6 .61 .62 .63 .63 .64 .67 .67 .68 .68
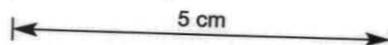.71 .72 .72 .72 .76 .77
Number of values= 16

MEAN OF VALUES .677
STD DEVIATION .051

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
60 - 64    | ▨▨▨▨▨▨
65 - 69    | ▨▨▨▨
70 - 74    | ▨▨▨▨▨
75 - 79    | ▨▨
```

5 cm

YURONGI-1

7705 FT

SORTED LIST
```
.38   .43   .45   .49   .49   .49   .49   .5   .5   .5
.51   .51   .52   .52   .52   .52   .52   .53   .53   .53
.53   .53   .54   .54   .56   .56   .58   .59   .6   .61
.61   .63
```
Number of values= 32

MEAN OF VALUES   .525
STD DEVIATION   .051

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
38 - 42     | ▓
43 - 47     | ▓▓▓
48 - 52     | ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓
53 - 57     | ▓▓▓▓▓▓▓▓▓
58 - 62     | ▓▓▓▓▓
63 - 67     | ▓
```

YURONGI-1

5 cm

7803 FT

SORTED LIST
```
.47   .48   .49   .5   .5   .52   .53   .53   .53   .53
.53   .54   .54   .55   .56   .57   .57   .57   .57   .58
.58   .59   .59   .6   .61   .62   .64   .64   .65   .65
.67   .69   .69
```
Number of values= 33

MEAN OF VALUES   .572
STD DEVIATION   .059

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
47 - 51     | ▓▓▓▓▓▓
52 - 56     | ▓▓▓▓▓▓▓▓▓▓▓▓▓
57 - 61     | ▓▓▓▓▓▓▓▓▓▓▓
62 - 66     | ▓▓▓▓▓
67 - 71     | ▓▓▓
```

5 cm

YURONGI-1

7935 FT

SORTED LIST
.47 .5 .54 .55 .56 .57 .57 .57 .59 .59
.61 .62 .65
Number of values= 13

MEAN OF VALUES .568
STD DEVIATION .046

HISTOGRAM OF RESULTS
Values are reflectance multiplied by 100

```
47 - 51     | ▓▓
52 - 56     | ▓▓▓
57 - 61     | ▓▓▓▓▓▓
62 - 66     | ▓▓
```

YURONGI-1

7935 FT