Report No. EPGS-DOM.3-85MPA

Vitrinite reflectance (Ro) on the dispersed organics in the Amoco Imperial Puffin B-90.

1165 VITRINITE REFLECTANCE (Ro) ON THE DISPERSED ORGANICS IN THE AMOCO IMPERIAL PUFFIN B-90; M.P. Avery

The following maturation levels were determined for Amoco-Imperial Puffin B-90:

%Ro	Depth in feet	
0.5	8961	Determined
0.6	10940	Determined
1.0	16485	Projected

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Vitrinite reflectance (Ro) on the dispersed organics in the Amoco Imperial Puffin B-90.

G.S.C. Locality No: D35

Location: 44°39'12.73"N, 53°42'28.35"W

R.T. Elevation: 98'

Sample Interval: 1060-15420

Total Depth: 15425'

Water Depth: 350'

Release Date: January 5, 1974

Interval Studied: 4180 - 8390'
13860 - 15190'

Units: All depths are in feet and referenced to R.T.

Vitrinite reflectance has been determined on 14 samples (Table II) from the Amoco Imperial Puffin B-90, which was classified as a wildcat well and is located on the southern Grand Banks, approximately 320 km (200 mi) south of St. John's, Newfoundland.

Data acquisition and manipulation for this report utilized the Zeiss Photomultiplier III Zonax microcomputer system. Improvements in the Zonax software provided the microscope operator with a dynamic histogram which was constantly displayed and updated on the computer monitor as readings were acquired, as well as with an essentially instant sorting of the values on a completed sample. Sample preparation followed the procedures listed in Appendix I. The analysis of the well revealed the thermal maturation intervals given in Table I. Specific maturation levels as set out were based on those of Dow (1977) (see also Report No. EPGS-DOM.9-83MPA).

Table I
Inferred Thermal Maturation Levels

Determined			
Above 6539'	0.25 - 0.4	% Ro	immature
6539-8961'	0.4 - 0.5	% Ro	immature approaching maturity
8961-10940'	0.5 - 0.6	% Ro	marginally mature
10940'	0.6	% Ro	peak of oil generation
15425'	0.91	% Ro	within oil window
Projected			
16485'	1.0	% Ro	peak of wet gas generation

Remarks

The sample coverage of vitrinite reflectance data (Figure 1) was adequate in the upper (4180 - 8390') and lower (13860 - 15190') sections of the well with a significant lack of data between 8390 - 13860'. Despite this hiatus a single continuous rank/depth line was calculated and plotted through all the data points. This best fit line is essentially identical to that of Tern A-68 which encountered a very similar stratigraphic section and had no significant gaps in sample coverage (Avery '85).

Also, a very similar pattern was identified in the reflectance data for the section between the two major unconformities found in both wells. The histograms for this interval were dominated by anomalously high reflectance values with very few values occurring within the normal or anticipated range for indigenous vitrinite. As noted in the Tern A-68 report, these high end populations were probably due to the presence of reworked vitrinite sourced from older, Carboniferous age sediments (Wade, J.A. and Bell, J.S. pers. comm.).

TAI valves as determined by J. Bujak show a much lower maturation level in both wells as compared to the vitrinite reflectance-based maturation level as determined here. (See comparison in Table IV)

These maturation data provide evidence indicating that the thermal regime at Puffin B-90 was suitable for the generation of oil and gas within the drilled section.

References

Avery, M.P., 1983. Vitrinite reflectance (Ro) on the dispersed organics in Mobil-Texaco-Pex Venture B-43. Report No. EPGS-DOM.9-83MPA, 2p., 3 figures.

Avery, M.P., 1985. Vitrinite reflectance (Ro) on the dispersed organics in the Amoco Imperial Skelly Tern A-68. Report No. EPGS-DOM.1-85MPA, 3p., 3 Tables, 1 figure.

Bujak, J.P., 1976. Kerogen type and thermal alteration index of Amoco-IOE Puffin B-90, Grand Banks. Report No. EPGS-DOM.36-76JPB.

Bujak, J.P., 1978. Organic type and thermal alteration index of Amoco-Imp-Skelly Tern A-68, Grand Banks. Report No. EPGS-DOM.11-78JPB.

Dow, W.G., 1977. Kerogen studies and geological interpretations. Journal of Geochemical Exploration, no. 7, p. 79-99.

Wade, J.A., 1977. Stratigraphic picks Amoco-IOE Puffin B-90. 'Report No. EPGS-STRAT.1-77JAW (revised in 1980).

April 4, 1985

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Table II

Summary of kerogen - based vitrinite reflectance

Seq. #	Sample #	Depth in feet	Mean Ro (SD)	Number of Total readings	readings Edited
1	KO436A	4180-4210	.3 (.06)	37	16
2	KO436B	4660-4690	.29 (.05)	23	22
3	KO436C	5020-5140	.35 (.06)	19	15
4	KO437A	5560-5590	.39 (.06)	30	26
5	KO437B	5920-6040	.37 (.05)	46	28
6	KO437C	6280-6310	.39 (.03)	23	13
7	KO438A	6730-6760	.42 (.06)	42	28
8	KO438B	7180-7210	.49 (.08)	20	10
9	KO438C	7670-7700	no readings	--	--
10	KO439A	7950-8090	.49 (.09)	95	25
11	KO439B	8360-8390	.51 (.05)	91	3
12	KO439C	13860-13890	.73 (.07)	50	49
13	KO440A	14360-14490	.81 (.09)	70	57
14	KO440B	14560-14590	.84 (.08)	71	50
15	KO440C	15160-15190	.89 (.11)	51	41

Note: All samples are Kerogen Type.

Table III

Formation Tops (Wade '77)

Depth	Formation
in casing	Banquereau
7280'	Early Eocence Chalk
7418'	UNCONFORMITY
7418'	Wyandot
7510'	Dawson Canyon
8610-8800'	Petrel Member
8996'	Logan Canyon
8996'	Eider Member
9508'	Naskapi
9768'	Avalon UNCONFORMITY
9768'	Missisauga
12404'	Verrill Canyon
15425'	T.D.

Table IV

Comparison of V.R. and TAI data (Bujak '76 and '78)

Well Name	T.D.	TAI(RO*)	Meas. Ro
Puffin B-90	15425'	2- (0.45)	0.91
Tern A-68	13743'	2 (0.6)	0.77

*Equivalent RO value from correlation with TAI value.

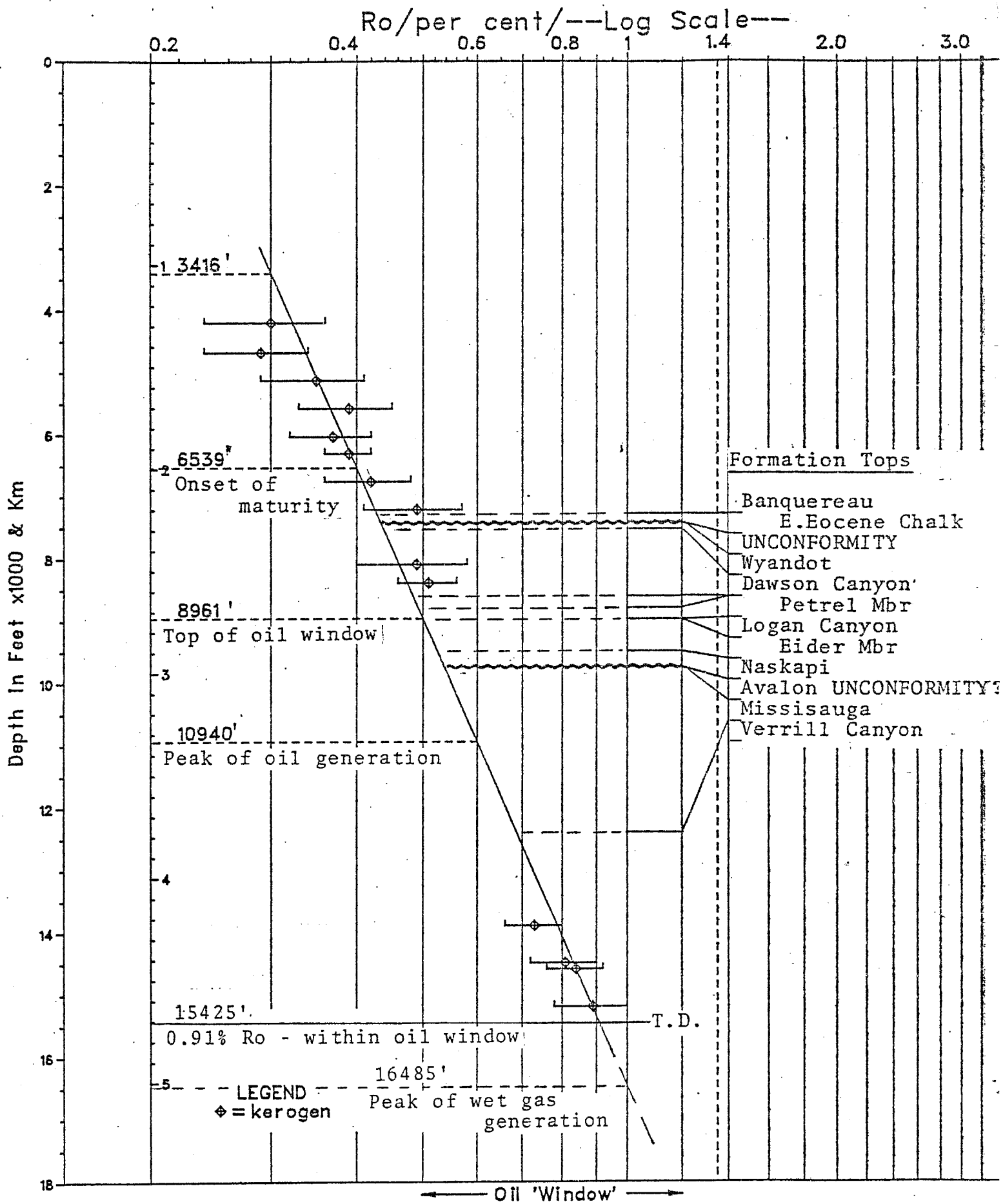

Figure 1 Puffin B-90

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 250ml plastic beaker.
Add 10% HCl till reaction ceases (removes carbonates).
Washed (rinsed) 3 times.
Conc. HF overnight (removes silicates).
Washed (rinsed) 3 times.
Heated (60-65°C) conc. HCl (remove fluorides caused by HF).
Washed 3 times.
Then put into 15ml test tube with 4-5ml 4% Alconox.
Differential centrifuge at 1500rpm for 90 sec.
Decant.
Wash 3 times with centrifuging.
Float off organic fraction using 2.0 S.G. Znbr solution.
Centrifuge 1000rpm, 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.

Vitrinite Reflectance Histograms

FILE >> K0436A DESCRIPTION FOLLOWS :
DEPTH 4180-4210', PUFFIN B-90, MIKE AVERY, FEB-14-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		*.21	*.22	*.23	*.26	*.26	*.26	*.28	*.29	*.3
1	*.31	*.31	*.32	*.34	*.38	*.38	*.4	.48	.48	.49
2	.56	.57	.59	.6	.66	.69	.69	.73	.74	.76
3	.76	.77	.8	.81	.81	.82	.91	.95		

SUM : 19.42 NUMBER : 37 MIN : .21 MAX : .95 MEAN : .52 STAN.DEV.: .23

EDITED STATISTICS * * * * *
SUM : 4.75 NUMBER : 16 MIN : .21 MAX : .4 MEAN : .3 STAN.DEV.: .06

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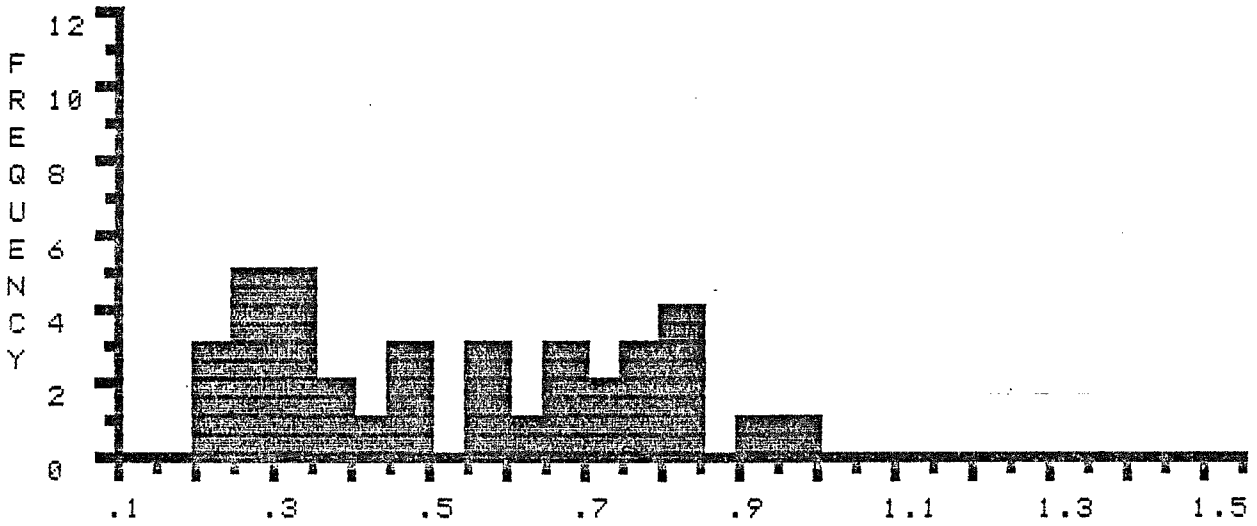

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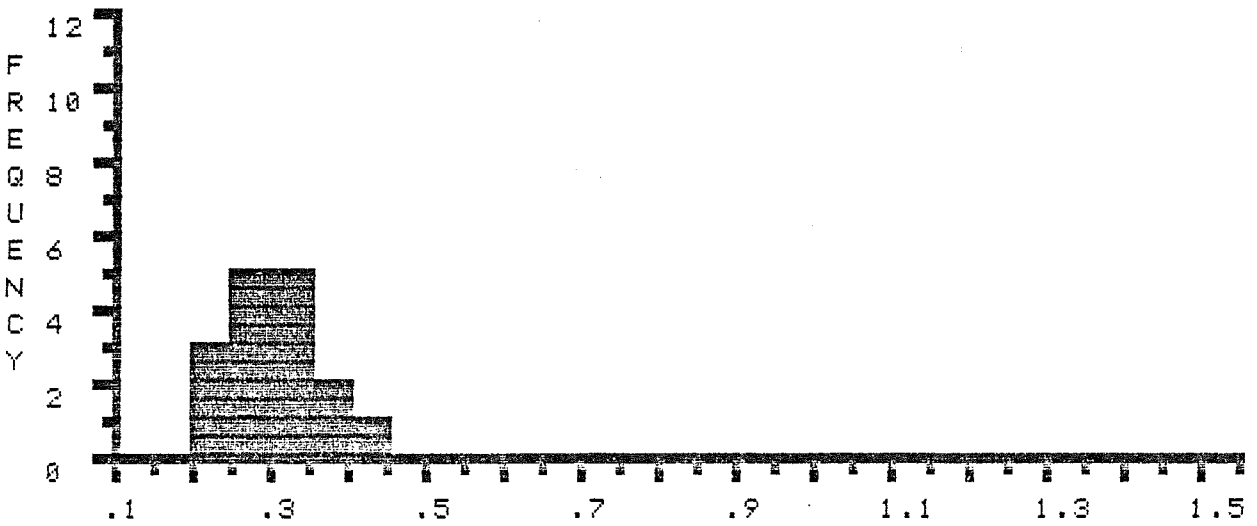

FILE >> K0436B DESCRIPTION FOLLOWS :
DEPTH 4660-4690', PUFFIN B-90, MIKE AVERY, FEB-14-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		*.21	*.22	*.23	*.23	*.24	*.26	*.26	*.26	*.26
1	*.28	*.29	*.3	*.3	*.31	*.31	*.32	*.32	*.34	*.34
2	*.38	*.38	*.4	.48						

SUM : 6.92 NUMBER : 23 MIN : .21 MAX : .48 MEAN : .3 STAN.DEV.: .07

EDITED STATISTICS * * * * *
SUM : 6.44 NUMBER : 22 MIN : .21 MAX : .4 MEAN : .29 STAN.DEV.: .05

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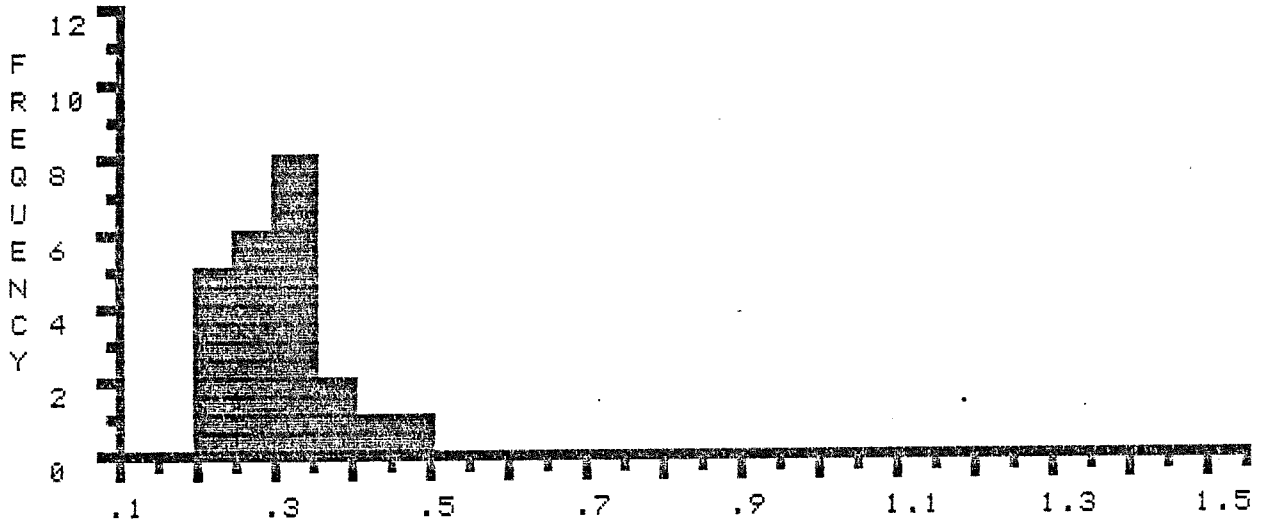

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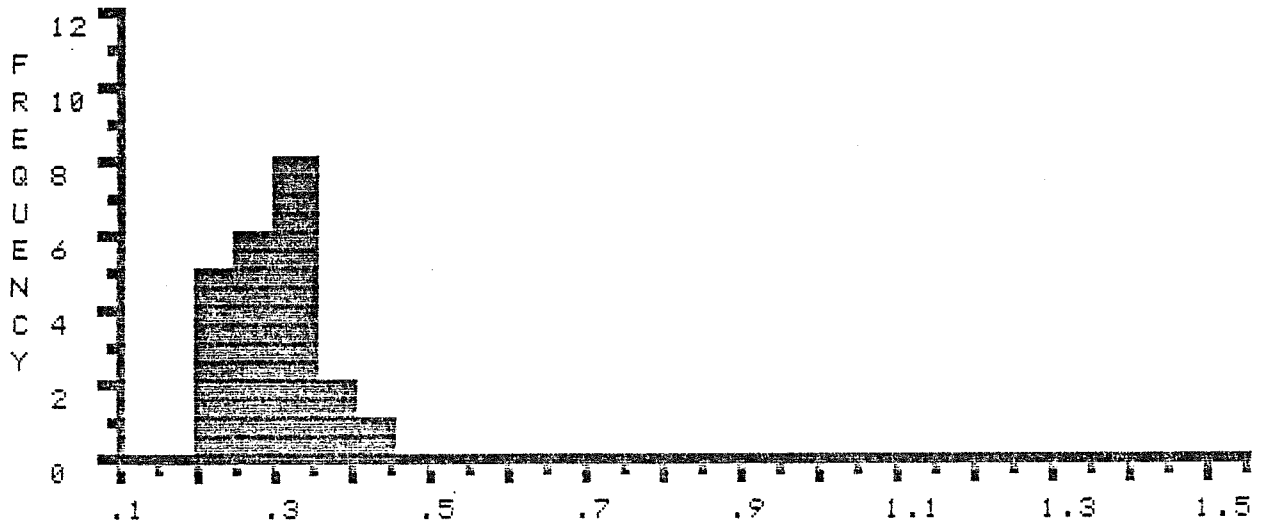

FILE >> K0436C DESCRIPTION FOLLOWS :
DEPTH 5020-5140', PUFFIN B-90, MIKE AVERY, FEB-15-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.17	.19	.21	*.28	*.29	*.3	*.3	*.31	*.31
1	*.31	*.33	*.34	*.35	*.37	*.4	*.43	*.45	*.47	.51

SUM : 6.32 NUMBER : 19 MIN : .17 MAX : .51 MEAN : .33 STAN.DEV.: .09

EDITED STATISTICS * * * * *
SUM : 5.24 NUMBER : 15 MIN : .28 MAX : .47 MEAN : .35 STAN.DEV.: .06

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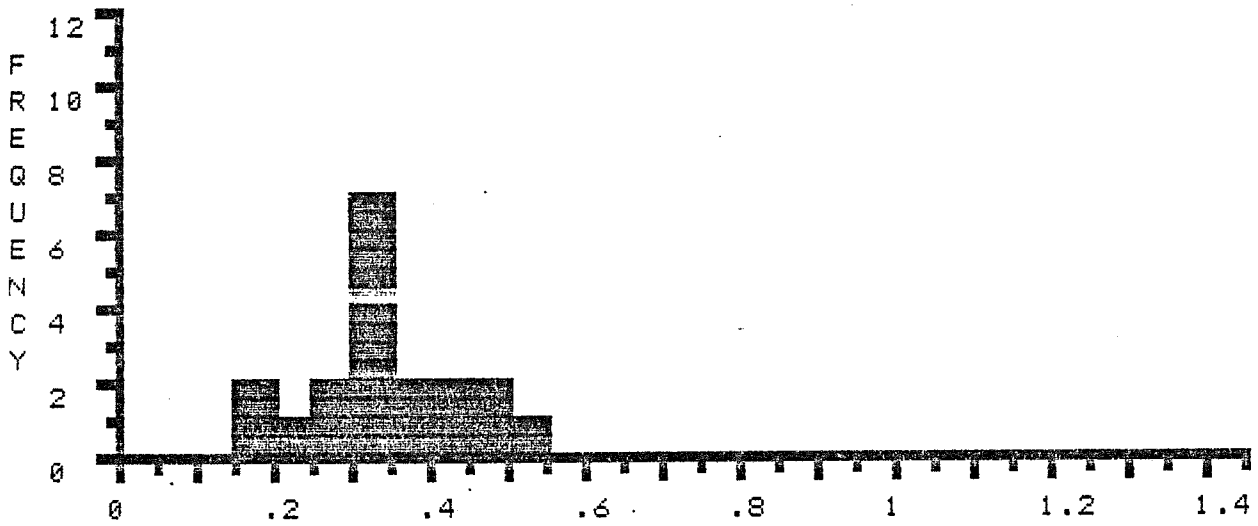

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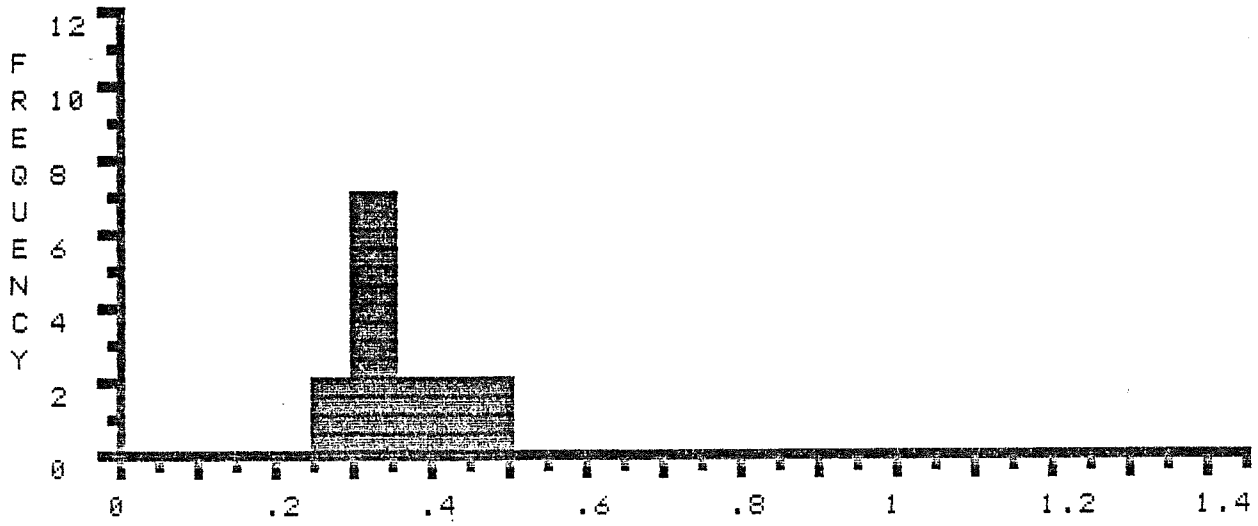

FILE >> K0437A DESCRIPTION FOLLOWS :
DEPTH 5560-5590', PUFFIN B-90, MIKE AVERY, FEB-15-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		*.27	*.28	*.3	*.32	*.34	*.35	*.35	*.36	*.36
1	*.37	*.37	*.37	*.38	*.39	*.39	*.39	*.39	*.4	*.4
2	*.41	*.43	*.44	*.48	*.5	*.51	*.51	.73	.78	.79
3	.91									

SUM : 13.27 NUMBER : 30 MIN : .27 MAX : .91 MEAN : .44 STAN.DEV.: .16

EDITED STATISTICS * * * * *
SUM : 10.06 NUMBER : 26 MIN : .27 MAX : .51 MEAN : .39 STAN.DEV.: .06

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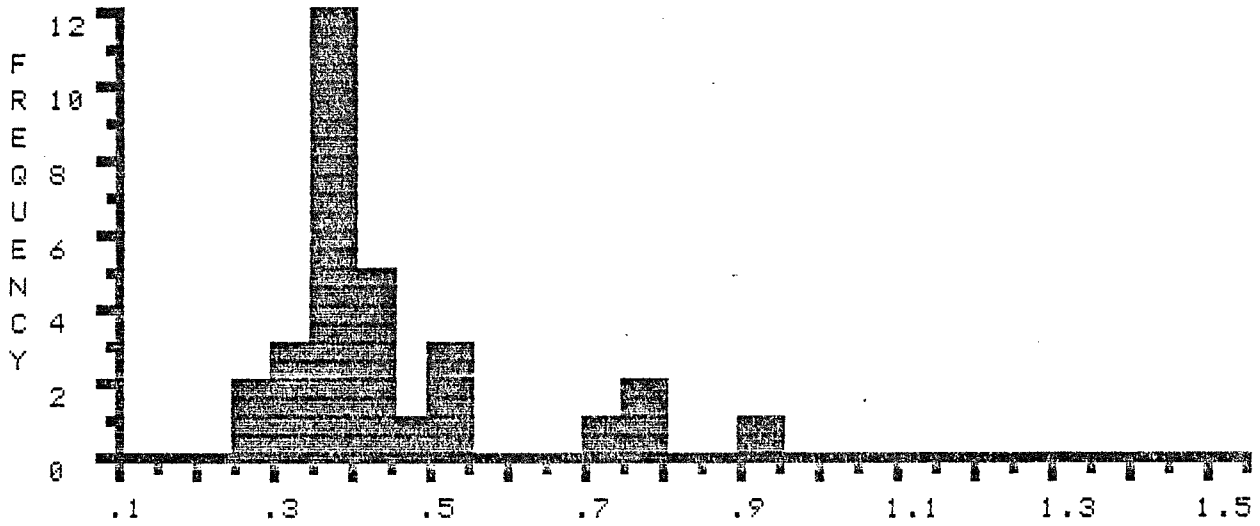

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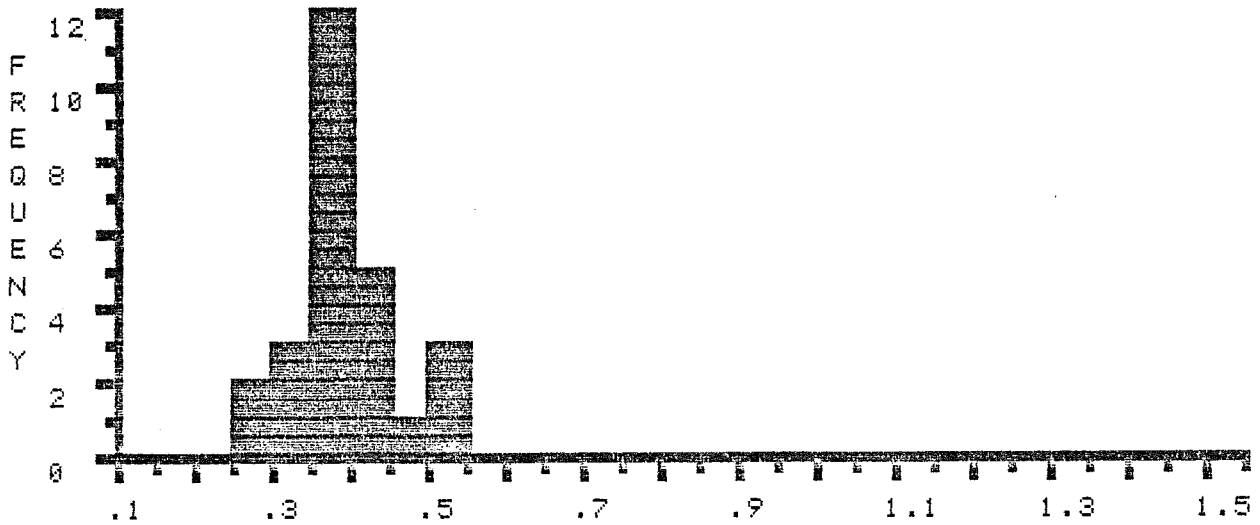

FILE >> K0437B DESCRIPTION FOLLOWS :
DEPTH 5920-6040', PUFFIN B-90, MIKE AVERY, FEB-26-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.23	.24	*.26	*.28	*.29	*.32	*.33	*.33	*.33
1	*.34	*.35	*.35	*.36	*.36	*.36	*.37	*.37	*.38	*.39
2	*.39	*.39	*.39	*.42	*.42	*.43	*.43	*.43	*.43	*.45
3	*.46	.51	.51	.53	.54	.56	.56	.57	.59	.6
4	.64	.68	.69	.75	.78	.84	.91			

SUM : 21.14 NUMBER : 46 MIN : .23 MAX : .91 MEAN : .46 STAN.DEV.: .16

EDITED STATISTICS * * * * *
SUM : 10.41 NUMBER : 28 MIN : .26 MAX : .46 MEAN : .37 STAN.DEV.: .05

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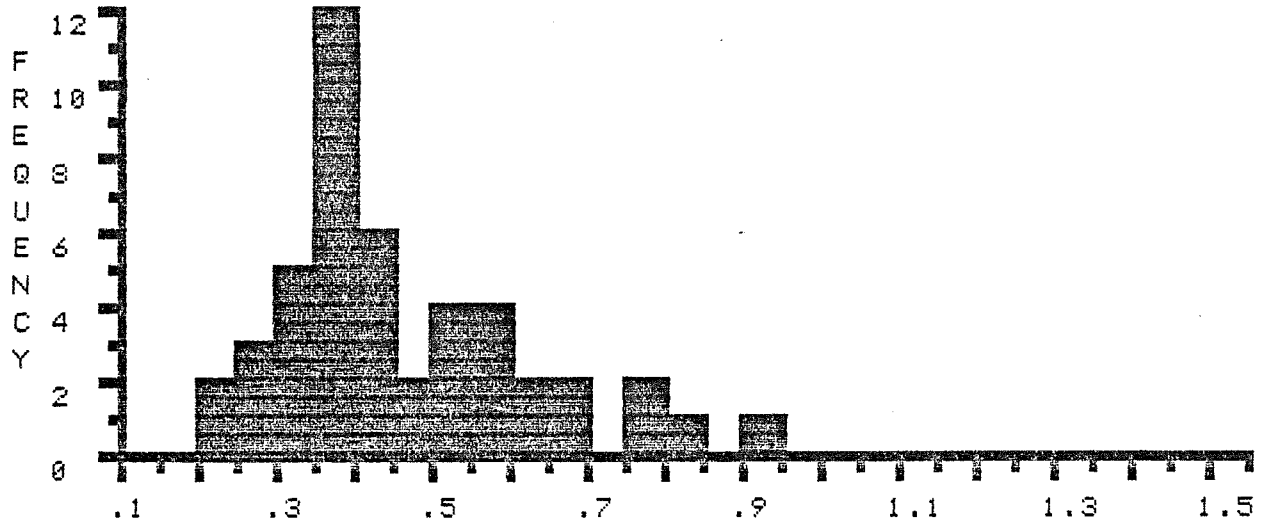

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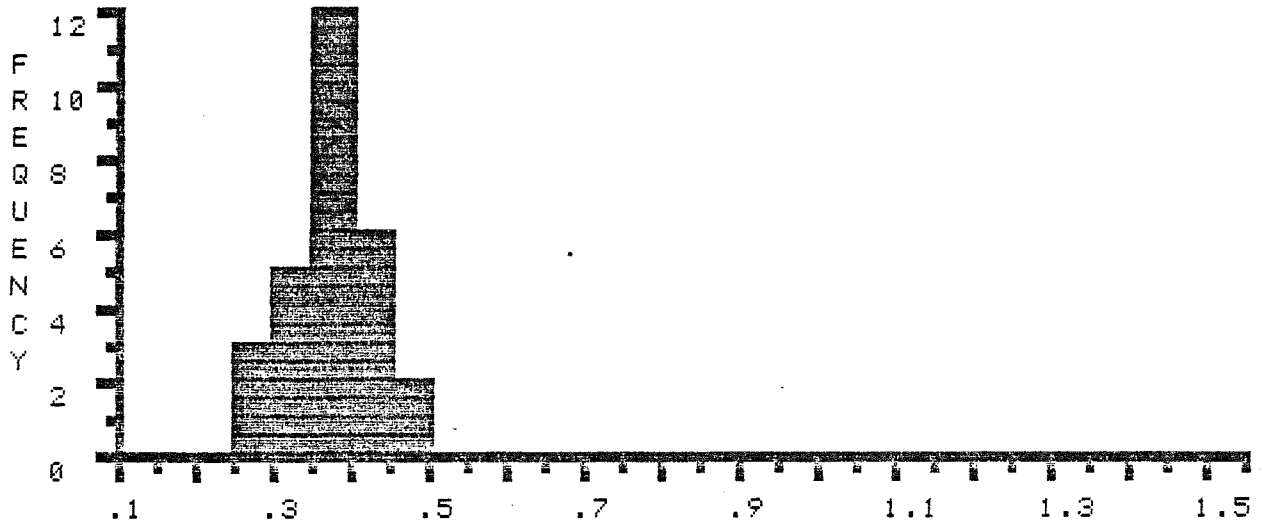

FILE >> K0437C DESCRIPTION FOLLOWS :
DEPTH 6280-6310', PUFFIN B-90, MIKE AVERY, FEB-26-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.2	.21	.23	*.33	*.35	*.36	*.38	*.39	*.39
1	*.39	*.39	*.4	*.4	*.41	*.41	*.44	.49	.51	.51
2	.52	.53	.57	.77						

SUM : 9.58 NUMBER : 23 MIN : .2 MAX : .77 MEAN : .42 STAN.DEV.: .12

EDITED STATISTICS * * * * *
SUM : 5.04 NUMBER : 13 MIN : .33 MAX : .44 MEAN : .39 STAN.DEV.: .03

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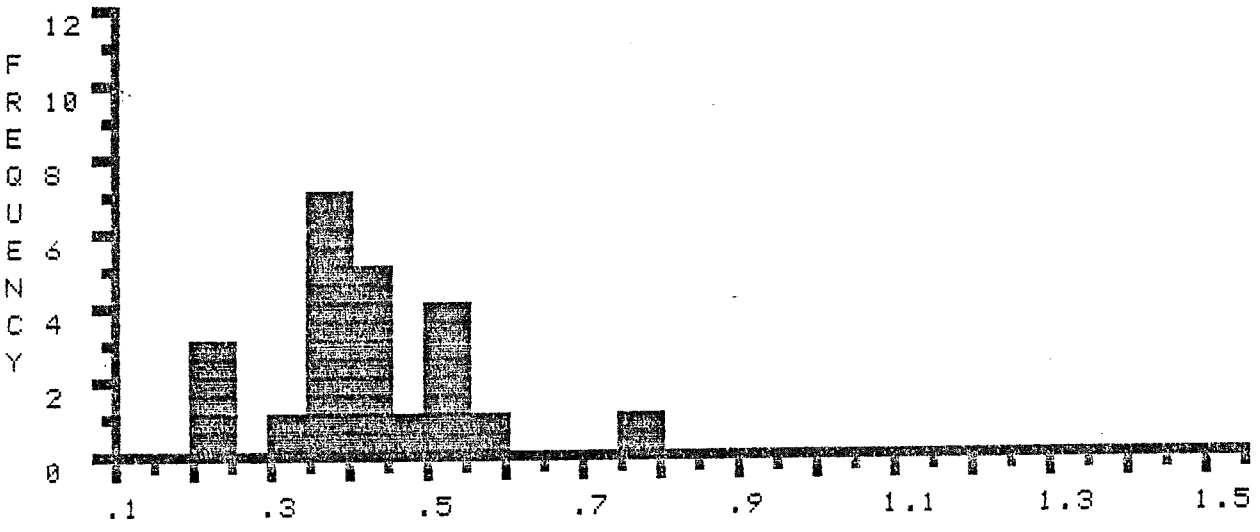

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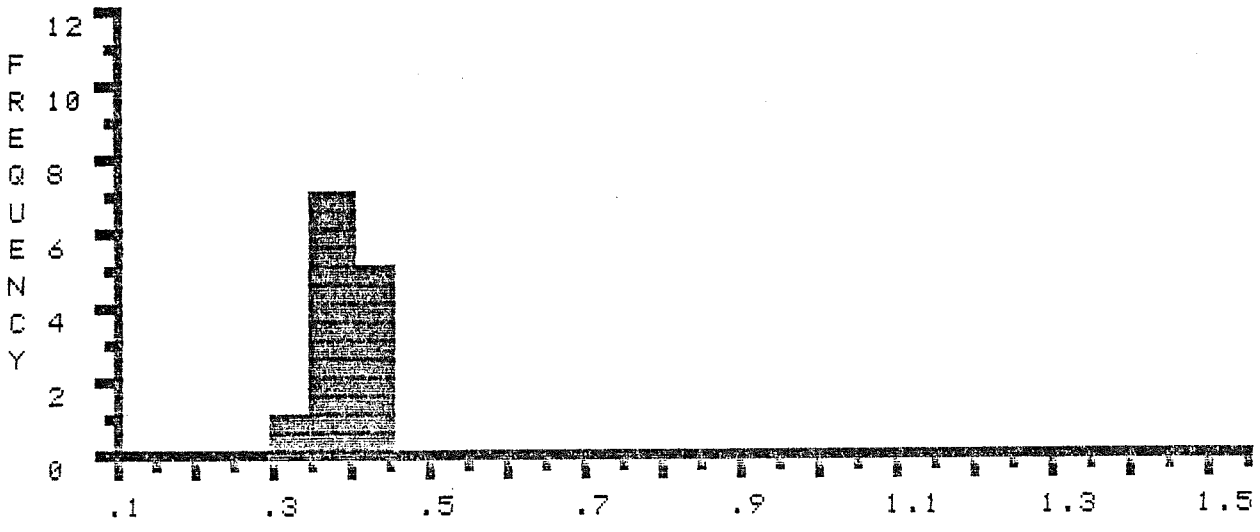
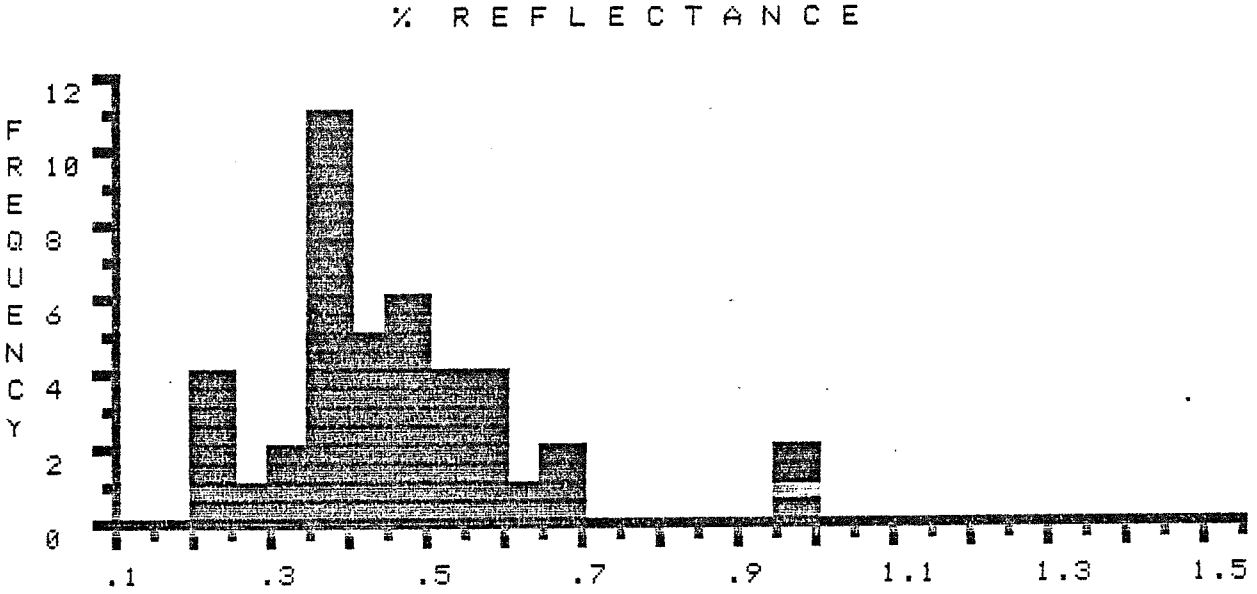


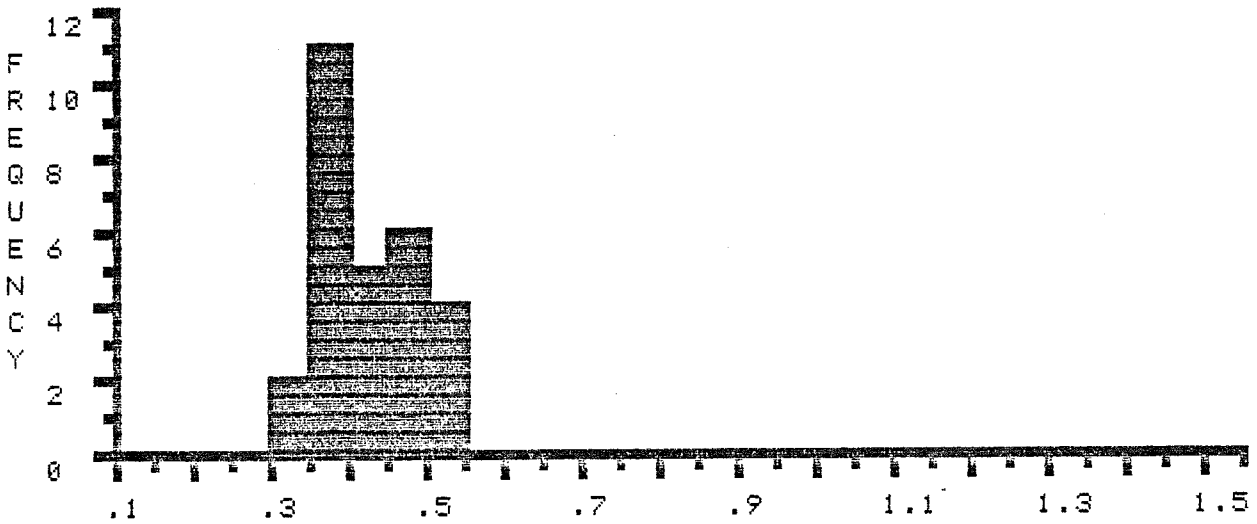
FILE >> K0438A DESCRIPTION FOLLOWS :
DEPTH 6730-6760', PUFFIN B-90, MIKE AVERY, FEB-26-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.2	.21	.22	.23	.25	*.33	*.33	*.35	*.35
1	*.35	*.36	*.36	*.37	*.38	*.38	*.38	*.39	*.39	*.4
2	*.41	*.41	*.43	*.44	*.45	*.45	*.47	*.47	*.47	*.49
3	*.52	*.53	*.53	*.54	.55	.56	.58	.58	.6	.67
4	.69	.96	.98							

SUM : 19.01 NUMBER : 42 MIN : .2 MAX : .98 MEAN : .45 STAN.DEV.: .17

EDITED STATISTICS * * * * *
SUM : 11.73 NUMBER : 28 MIN : .33 MAX : .54 MEAN : .42 STAN.DEV.: .06





FILE >> K0438B DESCRIPTION FOLLOWS :
DEPTH 7180-7210', PUFFIN B-90, MIKE AVERY, FEB-26-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.2	.21	.22	.23	.25	.26	*.39	*.4	*.4
1	*.5	*.5	*.51	*.52	*.53	*.54	*.63	.83	.86	.96
2	1.05									

SUM : 9.99 NUMBER : 20 MIN : .2 MAX : 1.05 MEAN : .5 STAN.DEV.: .26

EDITED STATISTICS * * * * *
SUM : 4.92 NUMBER : 10 MIN : .39 MAX : .63 MEAN : .49 STAN.DEV.: .08

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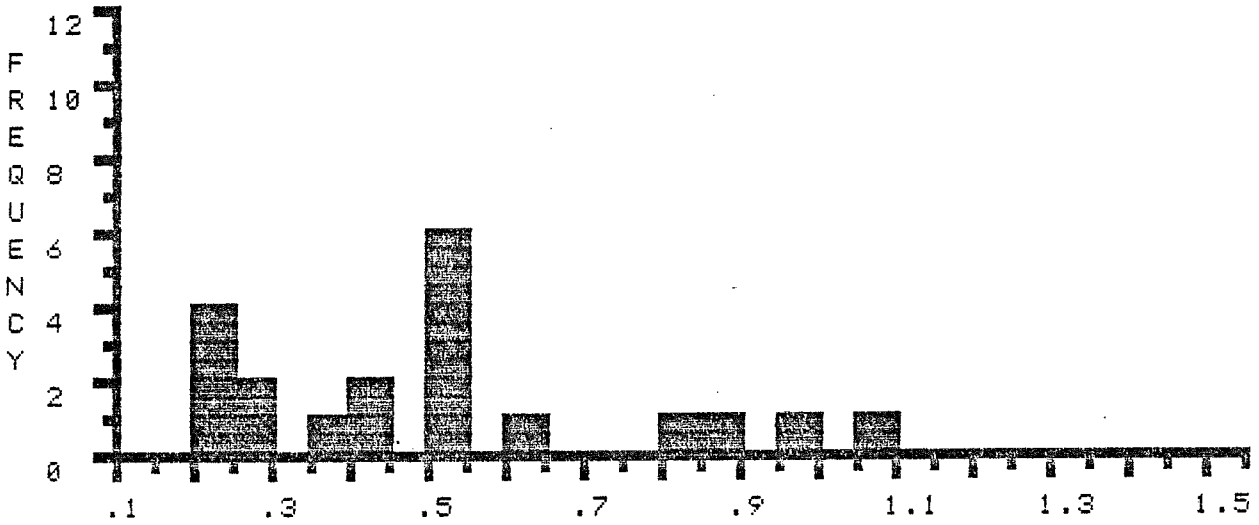

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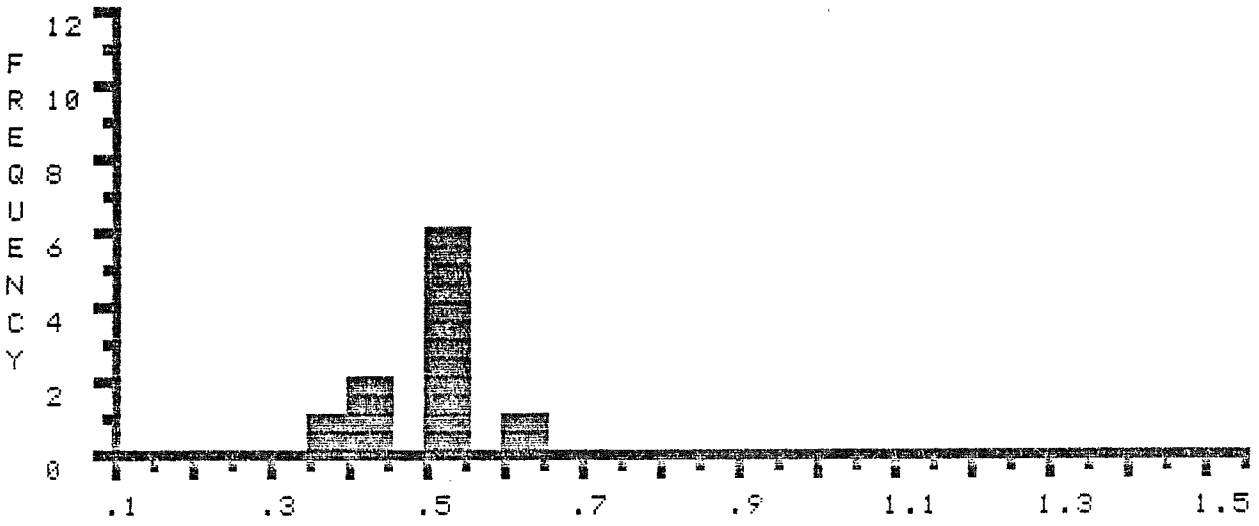

FILE >> K0439A DESCRIPTION FOLLOWS :
DEPTH 7950-8090', PUFFIN B-90, MIKE AVERY, FEB-27-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.25	.27	.28	.28	*.32	*.35	*.35	*.36	*.39
1	*.43	*.43	*.43	*.46	*.46	*.46	*.46	*.47	*.48	*.49
2	*.5	*.51	*.54	*.56	*.58	*.61	*.62	*.63	*.63	*.63
3	.68	.71	.72	.74	.77	.79	.79	.82	.84	.85
4	.87	.88	.88	.88	.88	.89	.9	.93	.95	.97
5	1	1	1.01	1.02	1.03	1.04	1.04	1.06	1.06	1.07
6	1.09	1.1	1.11	1.12	1.12	1.12	1.13	1.14	1.18	1.19
7	1.19	1.2	1.22	1.24	1.25	1.25	1.26	1.26	1.27	1.27
8	1.27	1.29	1.29	1.29	1.3	1.32	1.35	1.36	1.4	1.44
9	1.45	1.47	1.48	1.51	1.61	1.69				

SUM : 86.53 NUMBER : 95 MIN : .25 MAX : 1.69 MEAN : .91 STAN.DEV.: .37

EDITED STATISTICS * * * * *
SUM : 12.15 NUMBER : 25 MIN : .32 MAX : .63 MEAN : .49 STAN.DEV.: .09

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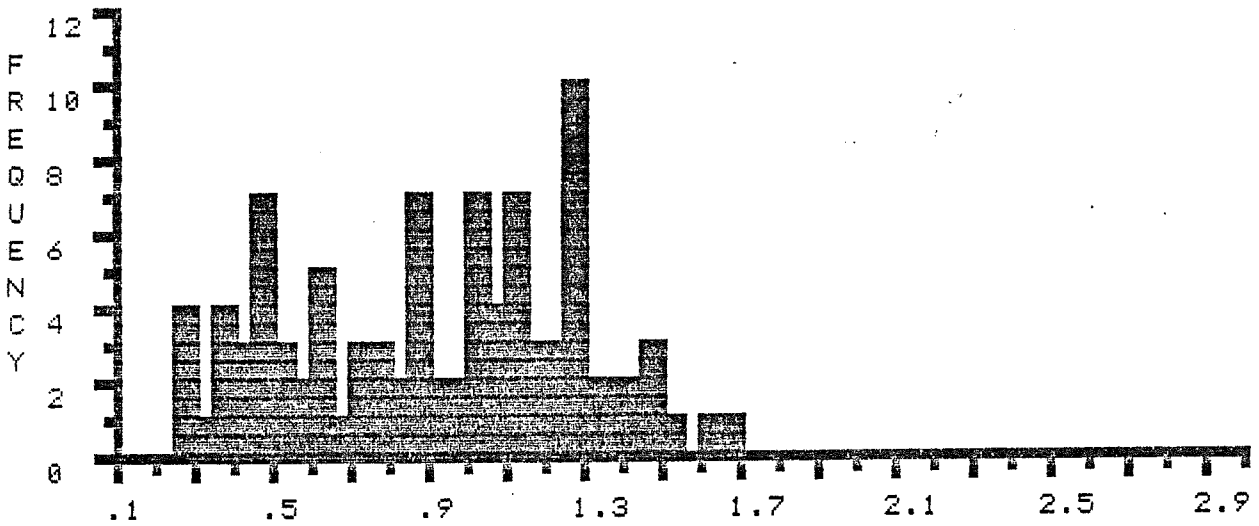

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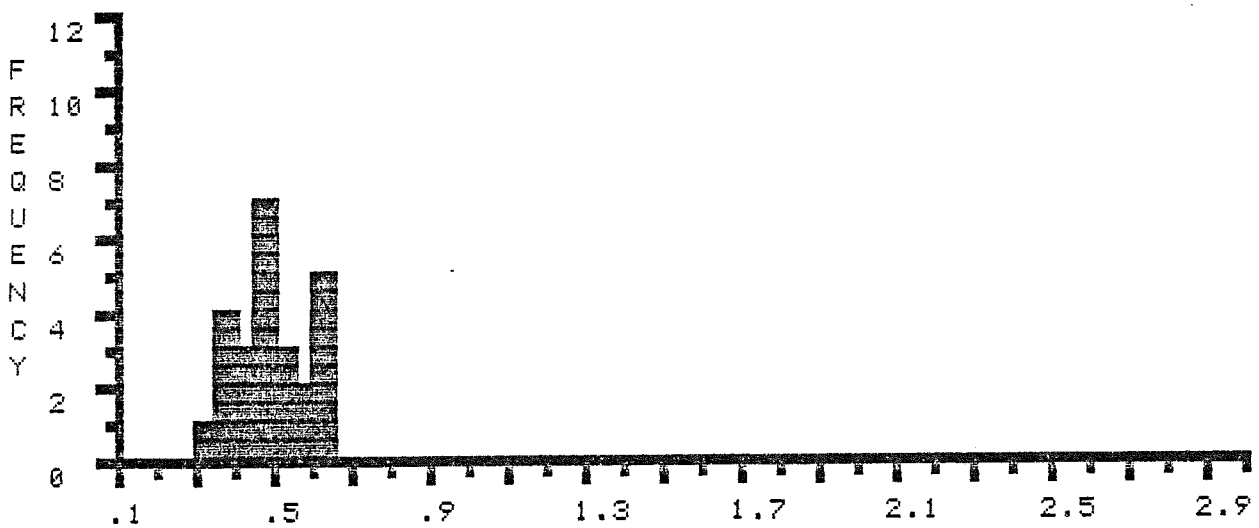


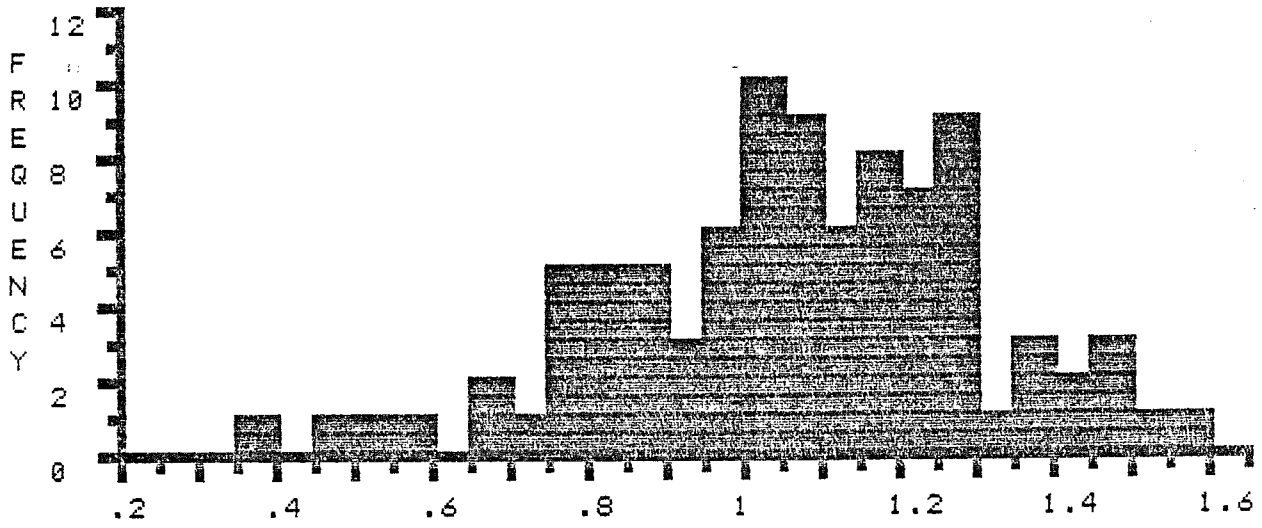
FILE >> K0439B DESCRIPTION FOLLOWS :
DEPTH 8360-8390', PUFFIN B-90, MIKE AVERY, FEB-27-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.35	*.46	*.51	*.56	.65	.65	.7	.75	.79
1	.79	.79	.79	.8	.81	.82	.83	.84	.86	.86
2	.86	.87	.87	.92	.93	.93	.95	.96	.98	.99
3	.99	.99	1	1	1	1	1.01	1.01	1.01	1.01
4	1.04	1.04	1.05	1.05	1.05	1.07	1.09	1.09	1.09	1.09
5	1.09	1.1	1.1	1.11	1.11	1.13	1.14	1.15	1.15	1.16
6	1.16	1.17	1.17	1.18	1.19	1.21	1.21	1.23	1.23	1.24
7	1.24	1.24	1.25	1.25	1.26	1.27	1.27	1.27	1.28	1.28
8	1.29	1.31	1.37	1.39	1.39	1.42	1.43	1.45	1.46	1.47
9	1.52	1.57								

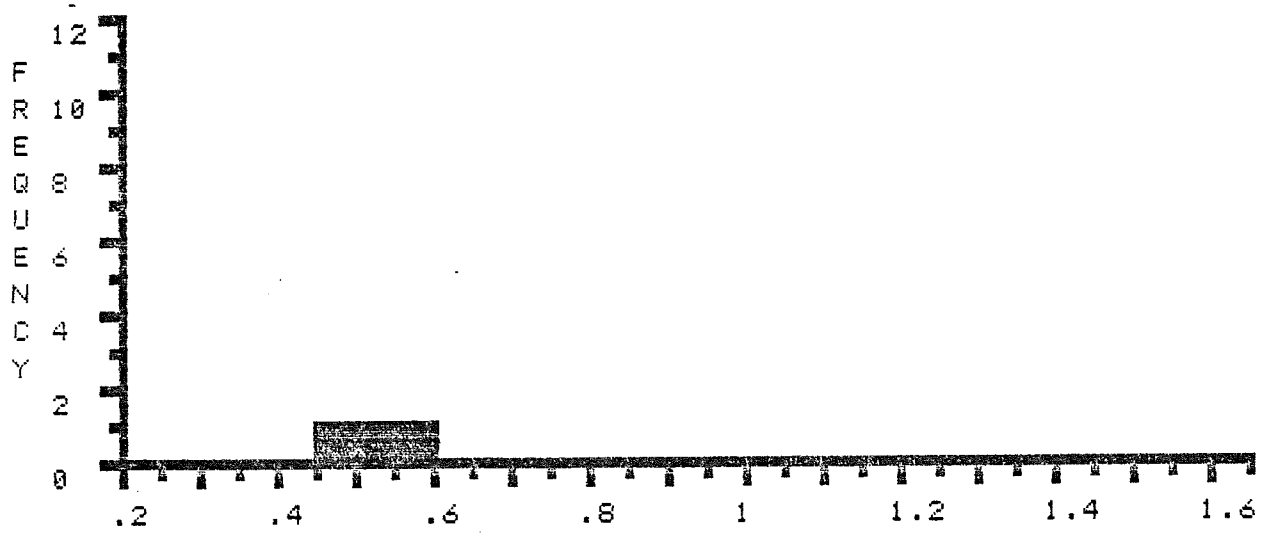
SUM : 96.46 NUMBER : 91 MIN : .35 MAX : 1.57 MEAN : 1.06 STAN.DEV.: .24

EDITED STATISTICS * * * * *
SUM : 1.53 NUMBER : 3 MIN : .46 MAX : .56 MEAN : .51 STAN.DEV.: .05

% R E F L E C T A N C E



% R E F L E C T A N C E * * EDITED * *



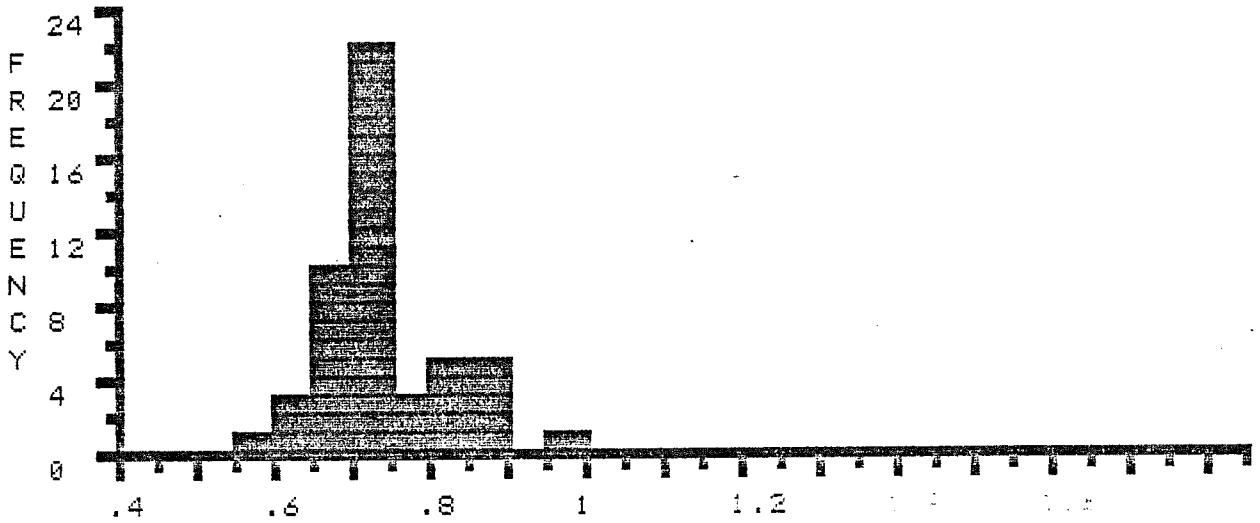
FILE >> K0439C DESCRIPTION FOLLOWS :
DEPTH 13860-13890', PUFFIN B-90, MIKE AVERY, FEB-28-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		*.59	*.63	*.64	*.64	*.65	*.65	*.65	*.67	*.68
1	*.68	*.68	*.68	*.68	*.69	*.7	*.7	*.7	*.7	*.71
2	*.71	*.71	*.71	*.72	*.72	*.72	*.72	*.72	*.72	*.72
3	*.72	*.73	*.73	*.73	*.73	*.74	*.74	*.75	*.78	*.79
4	*.81	*.81	*.82	*.83	*.83	*.85	*.87	*.88	*.89	*.89
5	.98									

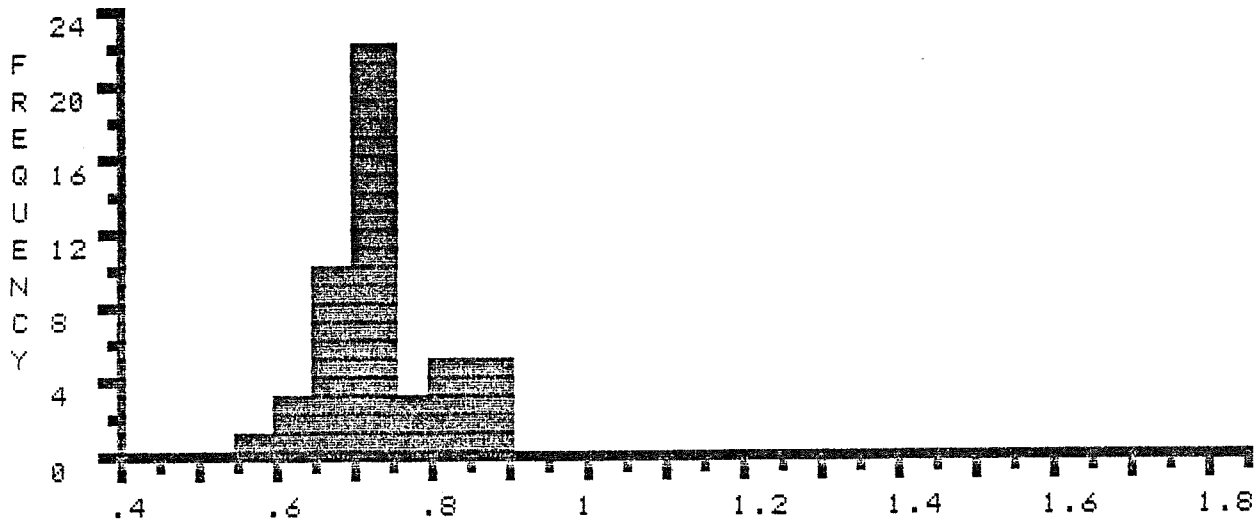
SUM : 36.79 NUMBER : 50 MIN : .59 MAX : .98 MEAN : .74 STAN.DEV.: .08

EDITED STATISTICS * * * * *
SUM : 35.81 NUMBER : 49 MIN : .59 MAX : .89 MEAN : .73 STAN.DEV.: .07

% R E F L E C T A N C E



% R E F L E C T A N C E * * EDITED * *



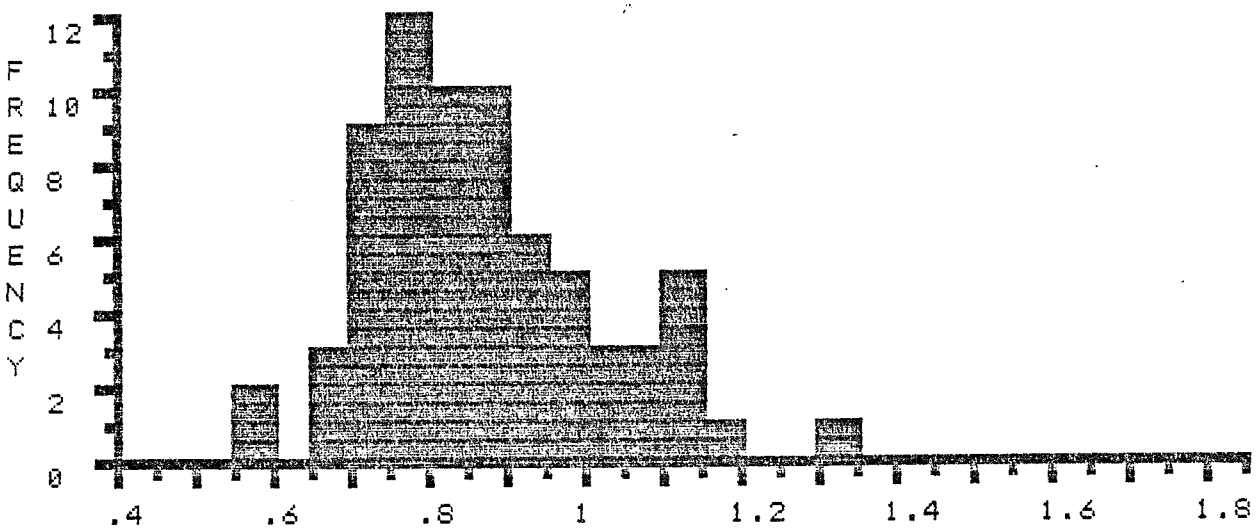
FILE >> K0440A DESCRIPTION FOLLOWS :
DEPTH 14360-14490', PUFFIN B-90, MIKE AVERY, FEB-28-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		*.57	*.59	*.65	*.69	*.69	*.7	*.7	*.72	*.72
1	*.73	*.73	*.73	*.74	*.74	*.75	*.75	*.76	*.76	*.76
2	*.76	*.77	*.78	*.78	*.78	*.79	*.79	*.8	*.81	*.81
3	*.82	*.82	*.82	*.83	*.83	*.84	*.84	*.85	*.86	*.86
4	*.87	*.87	*.87	*.87	*.88	*.89	*.89	*.9	*.9	*.91
5	*.93	*.93	*.93	*.95	*.95	*.96	*.96	*.98	1.03	1.03
6	1.03	1.05	1.06	1.09	1.1	1.1	1.11	1.12	1.13	1.18
7	1.31									

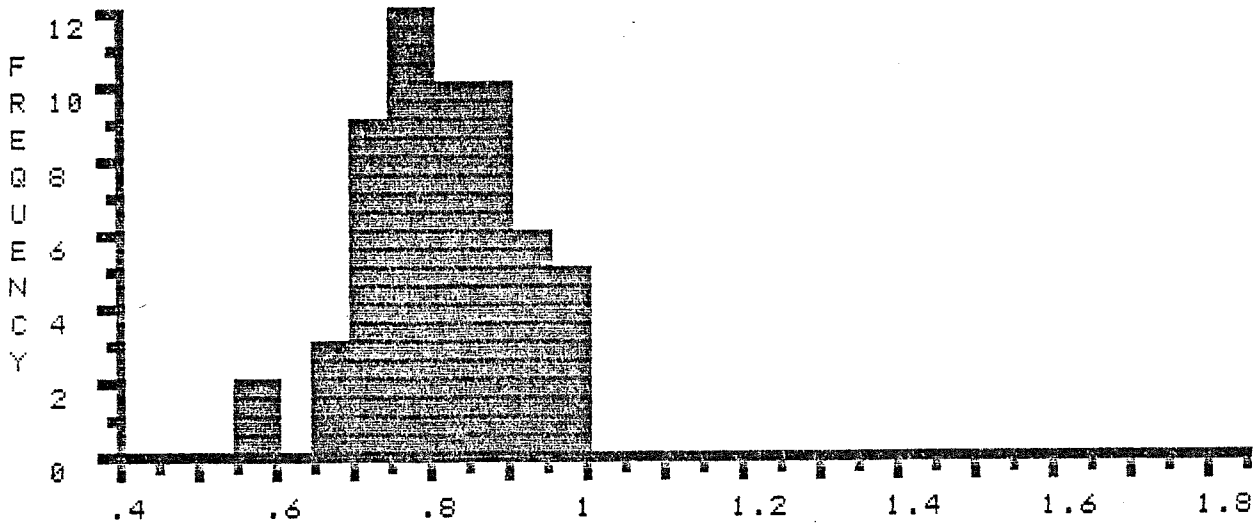
SUM : 60.5 NUMBER : 70 MIN : .57 MAX : 1.31 MEAN : .86 STAN.DEV.: .15

EDITED STATISTICS * * * * *
SUM : 46.16 NUMBER : 57 MIN : .57 MAX : .98 MEAN : .81 STAN.DEV.: .09

% R E F L E C T A N C E



% R E F L E C T A N C E * * EDITED * *



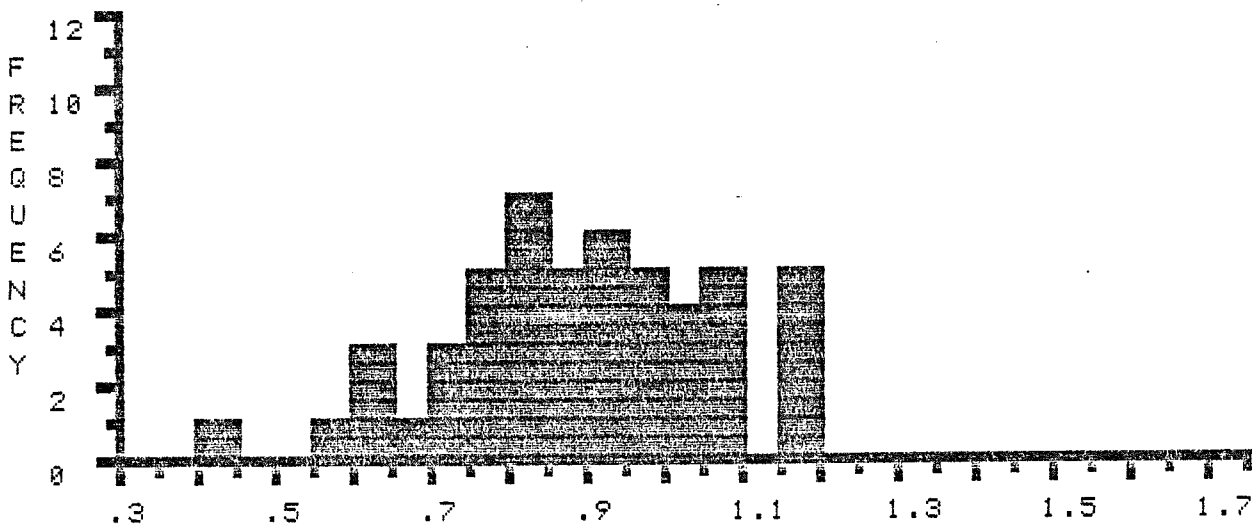
FILE >> K0440C DESCRIPTION FOLLOWS :
DEPTH 15160-15190', PUFFIN B-90, MIKE AVERY, FEB-28-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		.42	.59	.6	.63	.64	*.67	*.7	*.72	*.74
1	*.75	*.75	*.77	*.78	*.78	*.8	*.8	*.8	*.83	*.84
2	*.84	*.84	*.85	*.87	*.87	*.88	*.89	*.9	*.92	*.92
3	*.93	*.94	*.94	*.95	*.95	*.96	*.96	*.98	*1.01	*1.03
4	*1.04	*1.04	*1.05	*1.05	*1.06	*1.07	*1.08	1.15	1.15	1.15
5	1.16	1.16								

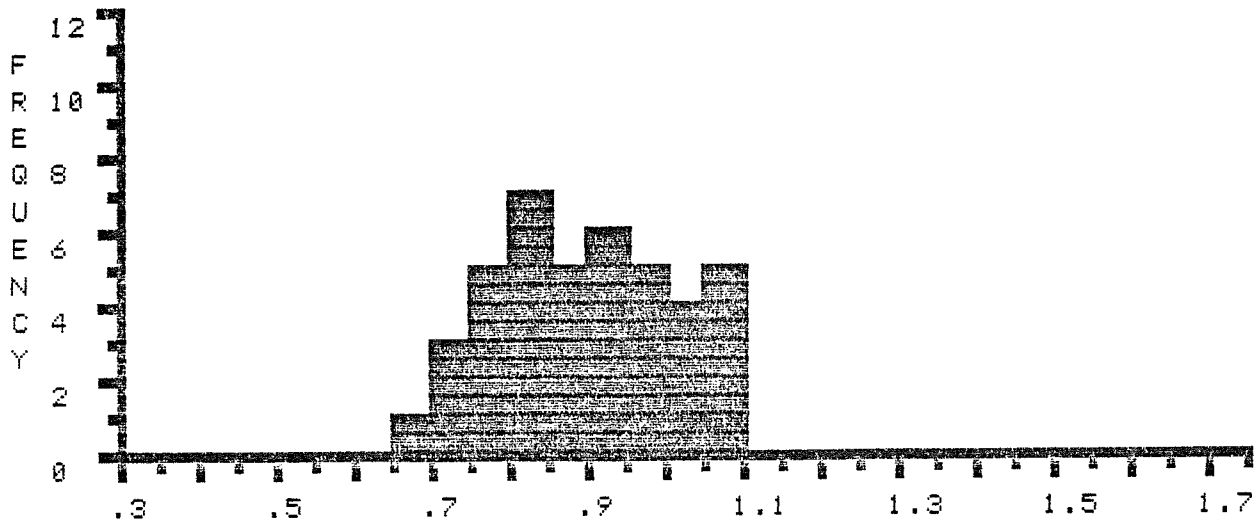
SUM : 45.2 NUMBER : 51 MIN : .42 MAX : 1.16 MEAN : .89 STAN.DEV.: .17

EDITED STATISTICS * * * * *
SUM : 36.55 NUMBER : 41 MIN : .67 MAX : 1.08 MEAN : .89 STAN.DEV.: .11

% R E F L E C T A N C E



% R E F L E C T A N C E * * EDITED * *



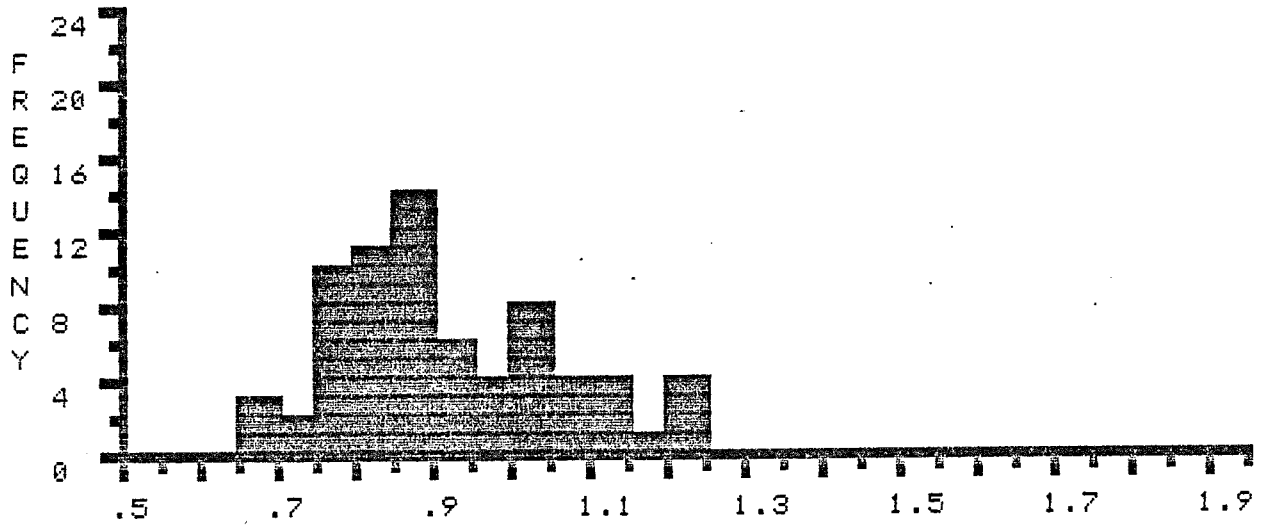
FILE >> K0440B DESCRIPTION FOLLOWS :
DEPTH 14560-14590', PUFFIN B-90, MIKE AVERY, FEB-28-85

COL>	0	1	2	3	4	5	6	7	8	9
ROW		*.65	*.68	*.69	*.73	*.74	*.75	*.75	*.76	*.77
1	*.78	*.78	*.78	*.79	*.79	*.79	*.8	*.8	*.8	*.8
2	*.8	*.81	*.81	*.82	*.82	*.83	*.84	*.85	*.86	*.86
3	*.86	*.87	*.87	*.87	*.87	*.87	*.87	*.88	*.89	*.89
4	*.89	*.9	*.91	*.92	*.93	*.94	*.94	*.95	*.97	*.97
5	*.98	1	1	1.01	1.01	1.01	1.02	1.02	1.03	1.06
6	1.07	1.09	1.09	1.1	1.1	1.12	1.14	1.18	1.2	1.2
7	1.21	1.23								

SUM : 64.66 NUMBER : 71 MIN : .65 MAX : 1.23 MEAN : .91 STAN.DEV.: .14

EDITED STATISTICS * * * * *
SUM : 41.77 NUMBER : 50 MIN : .65 MAX : .98 MEAN : .84 STAN.DEV.: .08

% R E F L E C T A N C E



% R E F L E C T A N C E * * EDITED * *