original

ORIGINAL

Mobil Exploration and Producing Services Inc.

P.O. BOX 900
DALLAS, TEXAS 75221

January 7, 1981

Dr. William Van Alen
Alaska Oil & Gas Conservation Commission
3001 Porcupine Drive
Anchorage, Alaska 99501

ESC REQUEST NO. 311A78
BIOSTRATIGRAPHY, VISUAL KEROGEN ANALYSIS, AND THERMAL MATURATION STUDIES,
PAN AMERICAN NAPATUK CREEK #1
BETHEL BASIN, ALASKA

Dear Dr. Alen:

This report describes the biostratigraphy, visual kerogen analysis and thermal maturation studies of the Pan American Napatuk Creek #1 well, Bethel Basin, Alaska. Diatom age determinations and paleoecological interpretations were made on 13 ditch samples taken between 120' and 2100'. Palynological studies and visual kerogen analysis are based on 68 ditch samples taken between 120' and 14890' (TD). Vitrinite reflectance is based on 51 ditch samples taken at 300' intervals between 60' and 14870'. A plot of the low-gray Ro means (figure 1), kerogen analysis sheets (table 1 from palynological analysis, and table 2 from vitrinite analysis), a summary of the thermal maturity and hydrocarbon potential (table 3), and histogram plots are included with the report.

Following is a summary of the biostratigraphy of the Pan American Napatuk Creek #1:

120'	to 760'	Pleistocene
760'	to 920'	Pliocene
920'	to 1240'	Early Pliocene
1240'	to 1560'	Late Miocene/Early Pliocene
1560'	to 2040'	Indeterminate
2040'	to 5100'	Barremian to Turonian
5100'	to 14890'	Indeterminate

Detailed results and conclusions are as follows.

120' to 760'; Pleistocene:

The diatoms Melosira sp., Actinoptychus senarius, Actinocyclus ehrenbergii, Rhaphoneis surirella, Caloneis sp., Stauroneis sp. and Paralia sulcata indicate a probable Pleistocene age and deposition in a coastal environment.

760' to 920'; Pliocene:

The top of this interval is defined by the occurrence of the diatoms Paralia sulcata, Melosira granulata, Eunotia sp., Rhaphoneis sp. cf. R. fucus and Delphineis sp. This is a coastal assemblage of probable Pliocene age.

920' to 1240'; Early Pliocene:

The assemblage of diatoms occurring in this interval is comprised of Paralia sulcata, Coscinodiscus marginatus, Cosmiodiscus insignis, Thalassionema nitzschoides, Actinoptychus splendens, A. senarius, Rhaphoneis surirella, Actinocyclus sp. cf. A. ochotensis, Thalassiosira usachevii, T. oestrupii, and Bacterosira fragilis. This assemblage indicates an Early Pliocene age and deposition in a shallow, inner shelf environment.

1240' to 1560'; Late Miocene/Early Pliocene:

This interval contains the diatoms Cosmiodiscus insignis, Coscinodiscus marginatus, Thalassiosira sp. 1, Paralia sulcata, Actinopthchus senarius, and miscellaneous brackish forms indicating a Late Miocene/Early Pliocene age and deposition in an inner shelf environment.

1560' to 2040'; Indeterminate:

Samples in this interval are barren of palynomorphs although the interval from 1720' to 1780' contains several species of diatoms indicating a marine environment. The interval from 1880' to 1940' contains several non-marine diatom species. Both of these diatom assemblages are indeterminate in age.

2040' to 5100'; Barremian to Turonian:

The top of the Cretaceous is placed at 2040' because of the abundance of Cretaceous spore taxa encountered. The overlying Tertiary section was barren of palynomorphs except for several reworked Cretaceous spores. The spore assemblage encountered in this interval includes Aequitriradites spinulosus, Cicatricosisporites pseudotripartitus, Appendicisporites bilateralis, Concavissimisporites variverrucatus, Microreticulatisporites uniformis, Acanthotriletes varispinosus, Distaltriangulisplrites perplexus, and Rouseisporites reticulatus. Longer ranging non-age diagnostic forms are also present. Dinoflagellates are very rare and too poorly preserved to identify. Fungal palynomorphs are abundant throughout this interval suggesting a moist terrestrial environment. Those palynomorphs below 5000' are most probably cavings because their TAI values are in conflict with the higher maturity interpretations evidenced by the vitrinite reflectance measurements.

5100' to 14890' (TD); Indeterminate:

The samples below 5100' are barren of palynomorphs.

Maturation Analysis

Results from TAI analysis of the Pan American Napatuk Creek #1 indicate that the section penetrated between 120' and 2040' is transitionally mature, that the interval between 2040' and 6030' is slightly mature, and that the interval between 6030' and 14890' (TD) is moderately mature to mature. Since the 5000' to 5300' interval contains igneous lithologies, and because the vitrinite interpretations indicate overmaturity below this interval, those palynomorphs occurring below 5000' are probably cavings as their TAI values are in conflict with the vitrinite readings.

Results from the palynological visual kerogen analysis of Pan American Napatuk Creek #1 are listed on the attached kerogen analysis sheet (table 1). Note that all of the samples analyzed from this well are dominated by cellulosic (gas type) kerogens. Results from fluorescence analysis of the palynology kerogen slides shows weak fluorescence from 5870' to 6250' (table 1). This zone of fluorescence is not present in the vitrinite kerogen slides (table 2), and is probably only a contaminant in the palynology kerogen slides.

Results from vitrinite reflectance studies indicate that the section penetrated from 60' to 2130' is thermally immature; that the interval between 2130' and 2700' is transitionally mature; that the interval from 2700' to 5100' is mature, and that the interval from 5100' to 14870' (TD) is overmature. A slight increase in thermal maturity is observed at the Tertiary-Cretaceous unconformity (2040'). The break in the plot of the low-gray Ro readings (figure 1) at 5100' is due to lithologies of welded tuffs from 5000' to 5300'. A summary of the thermal maturity and hydrocarbon potential of the Pan American napatuk Creek #1 samples is included with the report (table 3). Histogram plots of the Ro readings from each sample, grouped into .05 class intervals, are attached. The reflectance measurements used in this study were made by R. R. Taylor.

Time requirements for this job were charged to ESC Request No. 311A78. If you have any questions concerning our results or interpretations, please do not hesitate to contact us.

T. A. Timmcke

W. H. Abbott

TAT/jg
Attachments

FIGURE 1
Plot of Low-Gray Ro Means
Pan American Napatuk Creek #1
Bethel Basin, Alaska

M-048
(5-78)

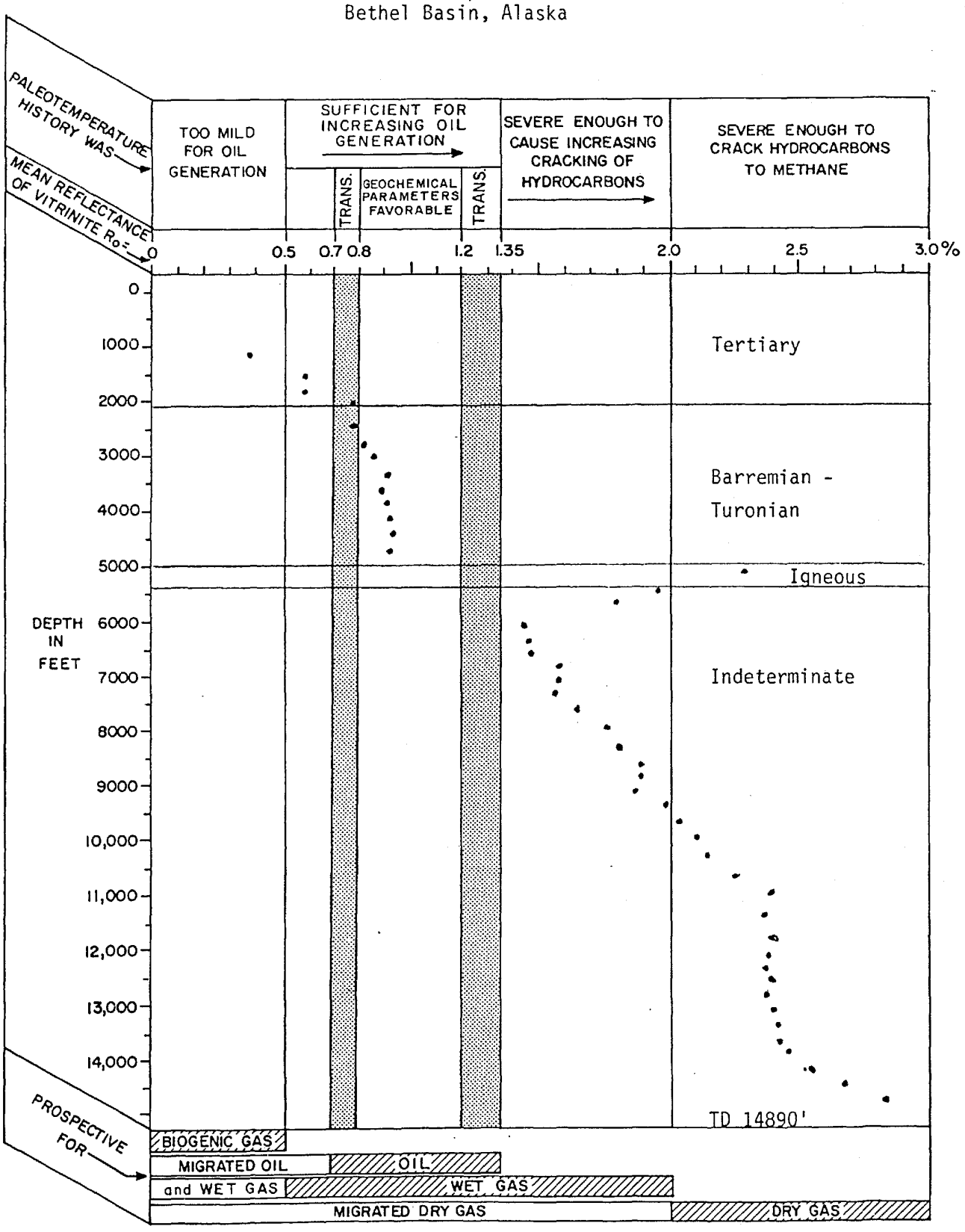


TABLE 1 (Palynological Analysis)

ORGANIC RESIDUE (KEROGEN) ANALYSIS

M-005 (Rev. 01-80)

SCALE: T : TRACE (<1%)
1 : 1 - 10% 6 : 51 - 60%
2 : 11 - 20% 7 : 61 - 70%
3 : 21 - 30% 8 : 71 - 80%
4 : 31 - 40% 9 : 81 - 90%
5 : 41 - 50% 10 : 91 - 100%

DATE: 11/25/91

PROJECT:
PAN AMERICAN
SAPATUK CREEK #1
BETHEL BASIN, ALASKA

ESC NO. 91178

ANALYST: T.A.T.

(DEPTH) OR NO.	AMORPHOUS (OIL RICH)	CUTICLE	PALYNOMORPHS	AMORPHOUS (GAS or OIL)	BARK & WOODY DEBRIS	INERTINITE	FUNGAL MATERIAL - CHITIN	% OF RESIDUE FLUORESCING	STRONG FLUORESCENCE	MODERATE FLUORESCENCE	WEAK FLUORESCENCE	LIGHT YELLOW FLUORESCENCE	MEDIUM YELLOW FLUORESCENCE	YELLOW BROWN (1+) IMMATURE	LIGHT BROWN (1+) IMMATURE	MEDIUM BROWN (2+) TRANSITIONAL	DARK BROWN (2+) SLIGHTLY MATURE	VERY DARK BROWN (3-) MOD. MATURE	BLACKISH BROWN (3+) MATURE	BLACK (4 to 4+) FULLY MATURE	METAMORPHOSED ROCK (5)	NO PALYNOMORPHS	OVERMATURE	GOOD	FAIR	POOR	MARINE	MARGINAL MARINE	NO MARINE PALYNOMORPHS	UNKNOWN PALYNOMORPHS	REMARKS:
120 - 180 FT.	2	T				4	4		2																						
180 - 340	T					1	9		T																						
400 - 500	T	T	T	T	1	2	7		T																						BISSACATE
500 - 600		T	T	T	7	1	2		0																						SPORE
760 - 820	1	1			2	3	3		1																						
920 - 980	T		T	4	1	5			T																						SPORE
1080 - 140	T			4	1	5			T																						
1240 - 300	T	T		2	3	5			T																						
1400 - 4100	1			1	3	6			1																						
1560 - 620	1	T	T	2	3	4	T		1																						MONOLETE
1720 - 780	2		T	2	4	2	T		2																						BISSACATE
1880 - 940	T		T	4	4	2	T		T																						
2040 - 100	T		T	4	4	2	T		T																						BISSACATE
2200 - 260	1	T	T	2	4	2	T		1																						BISSACATE
2360 - 720	T		T	5	3	2	T		T																						BISSACATE
2520 - 580			T	7	2	1	T		0																						BISSACATE
2680 - 740			T	6	2	2	T		0																						BISSACATE
2840 - 900	T		T	6	3	1	T		T																						BISSACATE
3000 - 060	1	T	T	4	4	1	T		1																						BISSACATE
3160 - 220	T		T	6	3	1	T		T																						BISSACATE
3320 - 380			T	4	4	2			0																						BISSACATE
3480 - 540			T	6	3	1	T		0																						BISSACATE
3640 - 700			T	6	3	1	T		0																						BISSACATE
3800 - 860			T	6	3	1	T		0																						BISSACATE
3960 - 4020			T	6	3	1	T		0																						SPORE
4120 - 180	T		T	6	2	2	T		T																						BISSACATE
4280 - 340			T	6	3	1	T		0																						BISSACATE
4440 - 500		T		6	3	1	T		0																						
4600 - 6600			T	5	3	2	T		0																						BISSACATE
4760 - 820			T	5	3	2	T		0																						SPORE
4920 - 980		T	T	5	3	2	T		0																						BISSACATE
5080 - 140			T	5	3	2	T		0																						BISSACATE
5240 - 300			T	5	3	2	T		0																						BISSACATE
5400 - 460			T	6	3	1	T		0																						SPORE
5560 - 620		T	T	5	4	1	T		0																						BISSACATE
5710 - 770	T		T	5	3	2	T		T																						BISSACATE
5870 - 930	3		T	1	4	2	T		3																						BISSACATE
6030 - 090	5		T		3	2	T		5																						SPORE
6190 - 250	4		T		4	2	T		4																						SPORE
6350 - 410	1	T	T	3	4	2	T		1																						SPORE
6510 - 570	2		T	3	3	2	T		2																						SPORE
6670 - 730	T	T	T	6	3	1	T		T																						SPORE
6830 - 890	1	T	T	3	4	2	T		1																						BISSACATE
6990 - 7050	1	T	T	3	4	2	T		1																						BISSACATE
7350 - 410	T	T	T	4	4	2	T		T																						BISSACATE
7710 - 770	T		T	5	4	1	T		T																						SPORE
8070 - 130			T	4	4	2			0																						SPORE
8430 - 490			T	4	4	2	T		0																						SPORE
8790 - 850			T	4	4	2	T		0																						SPORE
9150 - 210			T	4	4	2	T		0																						BISSACATE
9510 - 570			T	5	3	2	T		0																						SPORE
9760 - 810		T	T	3	4	3			0																						SPORE

TABLE 1 (continued)

ORGANIC RESIDUE (KEROGEN) ANALYSIS

M-005 (Rev. 01-80)

SCALE: T = TRACE (<1%)
1 = 1 - 10%
2 = 11 - 20%
3 = 21 - 30%
4 = 31 - 40%
5 = 41 - 50%
6 = 51 - 60%
7 = 61 - 70%
8 = 71 - 80%
9 = 81 - 90%
10 = 91 - 100%

DATE:

PROJECT:
PAN AMERICAN
NAPATUK CREEK #1
BETHEL BASIN, AK

ESC NO. 811A78

ANALYST: T.A.T.

DEPTH OR NO.

DEPTH OR NO.	TYPE OF ORGANIC MATTER: AMORPHOUS/OIL RICH	CUTICLE	PALYNOMORPHS	AMORPHOUS/GAS or OIL	BARK & WOODY DEBRIS	INERTINITE	FUNGAL MATERIAL - CHITIN	% OF RESIDUE	FLUOR.: STRONG FLUORESCENCE	MODERATE FLUORESCENCE	WEAK FLUORESCENCE	LIGHT YELLOW FLUORESCENCE	MEDIUM YELLOW FLUORESCENCE	LIGHT YELLOW	POLLEN COLOR, TAI AND MATURATION: YELLOW 1+ IMMATURE	MEDIUM BROWN 2+ IMMATURE	DARK BROWN 2+ TRANSITIONAL	VERY DARK BROWN 3- SLIGHTLY MATURE	BLACKISH BROWN 3 MOD. MATURE	BLACK 3+ MATURE	METAMORPHOSED 4 FULLY MATURE	NO PALYNOMORPHS	PRESRV: GOOD	FAIR	POOR	DEPOSITIONAL ENVIRONMENT: MARINE	MARGINAL MARINE	NO MARINE PALYNOMORPHS	UNKNOWN	REMARKS:
10110 - 140 FT.				4	3	3	T	0																							
10440 - 470			T	5	2	3		0						/									/								SPORE
10770 - 800			T	6	2	2	T	0						/									/								"
11100 - 130		T	T	5	2	3	T	0						/									/								"
11430 - 460			T	4	4	2	T	0						/	/								/								"
11760 - 790			T	4	4	2		0						/	/							/	/								"
12090 - 120			T	3	5	2	T	0						/									/								"
12420 - 450			T	3	5	2	T	0							/								/								SPORE
12750 - 780				4	4	2	T	0											/								/				
13080 - 110				3	5	2	T	0											/								/				
13410 - 440			T	4	5	1		0						/	/								/								SPORE
13770 - 800			T	4	5	1	T	0						/									/								"
14100 - 130			T	4	4	2		0						/	/							/	/								"
14430 - 460			T	3	5	2		0						/									/								"
14760 - 790			T	2	5	3		0						/									/								SPORE
14870 - 890				2	5	3	T	0											/								/				

(in feet)

TABLE 2 (Vitrinite Kerogen Analysis)

ORGANIC RESIDUE (KEROGEN) ANALYSIS

M-005 (Rev. 01-80)

SCALE: T : TRACE (<1%)
1 : 1 - 10% 6 : 51 - 60%
2 : 11 - 20% 7 : 61 - 70%
3 : 21 - 30% 8 : 71 - 80%
4 : 31 - 40% 9 : 81 - 90%
5 : 41 - 50% 10 : 91 - 100%

DATE:

PROJECT:
PAN AMERICAN
NAPATUK CREEK #1
BETHEL BASIN, ALASKA
ESC NO. 311A78
ANALYST: T.A. TIMMCK

DEPTH OR NO. (IN FEET)	TYPE OF ORGANIC MATTER: AMORPHOUS/OIL RICH	CUTICLE	PALYNOMORPHS	AMORPHOUS/GAS or OIL	BARK & WOODY DEBRIS	INERTINITE	FUNGAL MATERIAL - CHITIN	% OF RESIDUE FLUORESCING	FLUOR.: STRONG FLUORESCENCE	MODERATE FLUORESCENCE	WEAK FLUORESCENCE	POLLEN COLOR, TAI AND MATURATION: LIGHT YELLOW (1) IMMATURE	MEDIUM YELLOW (1+) IMMATURE	YELLOW BROWN (1+) IMMATURE	LIGHT BROWN (2+) TRANSITIONAL	MEDIUM BROWN (2+) SLIGHTLY MATURE	DARK BROWN (3-) MOD. MATURE	VERY DARK BROWN (3) MATURE	BLACKISH BROWN (3+) FULLY MATURE	BLACK (4 to 4+) TRANSITIONAL	METAMORPHOSED (4+) OVERMATURE	NO PALYNOMORPHS	PRESRV: GOOD	FAIR	POOR	DEPOSITIONAL ENVIRONMENT: MARINE	MARGINAL MARINE	NO MARINE PALYNOMORPHS	UNKNOWN	REMARKS:
60																															BARREN
300																															BARREN
600						2	8		0																						
900	T			1	2	7		T		/																					
1210						2	8		0																						
1500	T			5	2	3		T		/																					
1800				4	3	3		0																							
2130				4	2	4		0																							
2400	T			4	3	3		T		/																					
2700	T	T		3	4	3	T	T		/		/	/										/								SPORE
3000		T		4	3	3		0				/	/										/								SPORE
3300	T	T		3	4	3		T		/		/	/										/								SPORE
3600		T		3	3	4		0				/	/										/								SPORE
3900				5	2	3		0														/									
4200				4	3	3		0														/									
4500				4	2	4		0														/									
4800				5	2	3		0														/									
5100				4	2	4	T	0														/									
5400				4	3	3	T	0														/									
5730				3	3	4		0														/									
6000				5	2	3		0														/									
6300				5	2	3		0						/									/								SPORE
6600				6	2	2		0														/									
6910				5	2	3	T	0						/									/								SPORE FRAGMENT
7200				4	3	3		0						/									/								SPORE
7510				6	2	2	T	0														/									
7800				5	2	3		0														/									
8100				6	2	2		0														/									
8400				2	4	4		0														/									
8700				3	3	4	T	0														/									
9000				4	3	3	T	0						/	/								/								SPORE FRAGMENT
9300				4	3	3		0														/									
9600				6	2	2		0														/									
9900				5	2	3		0														/									
10200				6	2	2		0														/									
10500				4	2	4		0														/									
10800				4	2	4		0														/									
11000				5	2	3		0														/									
11400				4	2	4		0														/									
11700				4	2	4		0														/									
12000				5	1	4		0														/									
12300				6	2	2		0														/									
12600				4	3	3		0														/									
12900				5	1	4	T	0														/									
13200				4	2	4		0														/									
13500				5	2	3		0							/								/								SPORE
13800				5	1	4		0														/									
14100				5	3	2		0														/									
14400				4	2	4		0														/									
14700				5	1	4		0														/									
14870				4	1	5		0														/									

TABLE 3
Ro Means, TAI, and Kerogen Type
Pan American Napatuk Creek #1, Bethel Basin, Alaska

DEPTH OR SPL. NO.	LOW-GRAY Ro MEAN	% POP.	FIRST HIGH-GRAY Ro MEAN	% POP.	TAI	THERMAL MATURITY	KEROGEN TYPE	HYDROCARBON POTENTIAL/REMARKS
60'	-					-	-	Barren of kerogen
300'	-					-	-	Barren of kerogen
600'	-					-	Cellulosic	No In Situ vitrinite
900'	-					-	Cellulosic	No In Situ vitrinite
1210'	0.38	49	1.61	42		Immature	Cellulosic	Gas type kerogen
1500'	0.60	32	1.40	63		Immature	Cellulosic	Gas type kerogen
1800'	0.60	82	1.65	14		Immature	Cellulosic	Gas type kerogen
2130'	0.78	60	1.25	36		Trans.mature	Cellulosic	Gas type kerogen
2400'	0.79	87	1.29	11		Trans.mature	Cellulosic	Gas type kerogen
2700'	0.83	76	1.35	20	2+,3-	Mature	Cellulosic	Gas type kerogen
3000'	0.90	81	1.58	17	2+,3-	Mature	Cellulosic	Gas type kerogen
3300'	0.94	44	1.43	39	2+,3-	Mature	Cellulosic	Gas type kerogen
3600'	0.89	67	1.36	32	2+,3-	Mature	Cellulosic	Gas type kerogen
3900'	0.92	24	1.97	76		Mature	Cellulosic	Gas type kerogen
4200'	0.93	11	2.10	89		Mature	Cellulosic	Gas type kerogen
4500'	0.95	38	2.44	61		Mature	Cellulosic	Gas type kerogen
4800'	0.92	15	1.65	67		Mature	Cellulosic	Gas type kerogen

TABLE 3
Ro Means, TAI, and Kerogen Type
Pan American Napatuk Creek #1, Bethel Basin, Alaska

DEPTH OR SPL. NO.	LOW-GRAY Ro MEAN	% POP.	FIRST HIGH-GRAY Ro MEAN	% POP.	TAI	THERMAL MATURITY	KEROGEN TYPE	HYDROCARBON POTENTIAL/REMARKS
5100'	2.25	89				Overmature		Igneous interval
5400'	1.95	45	2.62	28		Overmature	Cellulosic	Gas type kerogen
5730'	1.86	63	2.60	27		Overmature	Cellulosic	Gas type kerogen
6000'	1.44	43	2.34	23		Overmature	Cellulosic	Gas type kerogen
6300'	1.48	86	2.05	8	3-	Overmature	Cellulosic	Gas type kerogen
6600'	1.49	84	1.90	5		Overmature	Cellulosic	Gas type kerogen
6910'	1.66	82	2.43	16	3-	Overmature	Cellulosic	Gas type kerogen
7200'	1.66	84	2.21	6	3-	Overmature	Cellulosic	Gas type kerogen
7510'	1.63	60	2.21	30		Overmature	Cellulosic	Gas type kerogen
7800'	1.71	68	2.10	22		Overmature	Cellulosic	Gas type kerogen
8100'	1.80	63	2.12	16		Overmature	Cellulosic	Gas type kerogen
8400'	1.86	79	2.18	9		Overmature	Cellulosic	Gas type kerogen
8700'	1.93	65	2.30	20		Overmature	Cellulosic	Gas type kerogen
9000'	1.93	62	2.33	29	3-,3+	Overmature	Cellulosic	Gas type kerogen
9300'	1.88	80	2.32	7		Overmature	Cellulosic	Gas type kerogen
9600'	1.99	69	2.46	16		Overmature	Cellulosic	Gas type kerogen
9900'	2.06	68	2.47	25		Overmature	Cellulosic	Gas type kerogen

TABLE 3
Ro Means, TAI, and Kerogen Type
Pan American Napatuk Creek #1, Bethel Basin, Alaska

DEPTH OR SPL. NO.	LOW-GRAY Ro MEAN	% POP.	FIRST HIGH-GRAY Ro MEAN	% POP.	TAI	THERMAL MATURITY	KEROGEN TYPE	HYDROCARBON POTENTIAL/REMARKS
10200'	2.13	74	2.49	18		Overmature	Cellulosic	Gas type kerogen
10500'	2.18	40	2.54	55		Overmature	Cellulosic	Gas type kerogen
10800'	2.27	46	2.63	39		Overmature	Cellulosic	Gas type kerogen
11000'	2.39	52	2.66	42		Overmature	Cellulosic	Gas type kerogen
11400'	2.31	60	2.63	30		Overmature	Cellulosic	Gas type kerogen
11700'	2.33	63	2.68	25		Overmature	Cellulosic	Gas type kerogen
12000'	2.34	84	2.83	-		Overmature	Cellulosic	Gas type kerogen
12300'	2.28	65	2.81	7		Overmature	Cellulosic	Gas type kerogen
12600'	2.34	57	3.24	1		Overmature	Cellulosic	Gas type kerogen
12900'	2.28	66	3.07	5		Overmature	Cellulosic	Gas type kerogen
13200'	2.34	57	2.89	10		Overmature	Cellulosic	Gas type kerogen
13500'	2.39	48	2.92	23	3+	Overmature	Cellulosic	Gas type kerogen
13800'	2.37	45	3.00	16		Overmature	Cellulosic	Gas type kerogen
14100'	2.45	36	3.00	16		Overmature	Cellulosic	Gas type kerogen
14400'	2.57	28	3.09	21		Overmature	Cellulosic	Gas type kerogen
14700'	2.72	28	3.20	30		Overmature	Cellulosic	Gas type kerogen
14870'	2.85	62	3.46	12		Overmature	Cellulosic	Gas type kerogen

[redacted]

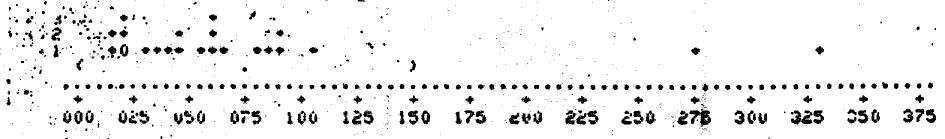
Diagram = Do not

```
**COMMAND = LO
...FIRST SAMPLE NO. = 0
...LAST SAMPLE NO.  = 99999
...LOAD COMMAND =  LP
```

12/11/81 18888 50 600' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

NO IN SITU VITRINITE

```
        N =   22
     MEAN =   16
STD. ERR. =    2
STD. DEV. =    9
PCT. POP. =   44
```

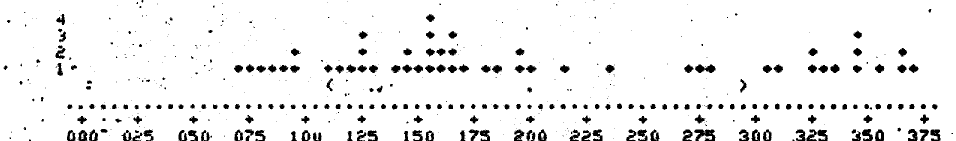


RECEIVED
JAN 13 1982

12/11/81 18889 50 300' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

NO IN SITU VITRINITE

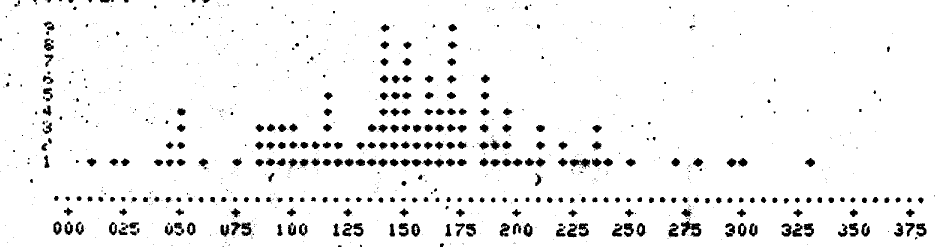
```
        N =   51
     MEAN =  203
STD. ERR. =   26
STD. DEV. =   93
PCT. POP. =   79
```



12/11/81 18890 50 600' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

NO IN SITU VITRINITE

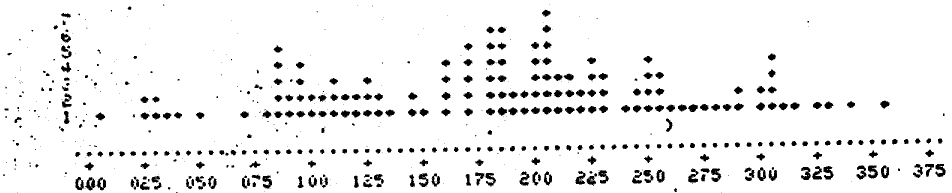
```
        N =  121
     MEAN =  152
STD. ERR. =   10
STD. DEV. =   58
PCT. POP. =   96
```



12/11/81 18891 50 900' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

NO IN SITU VITRINITE

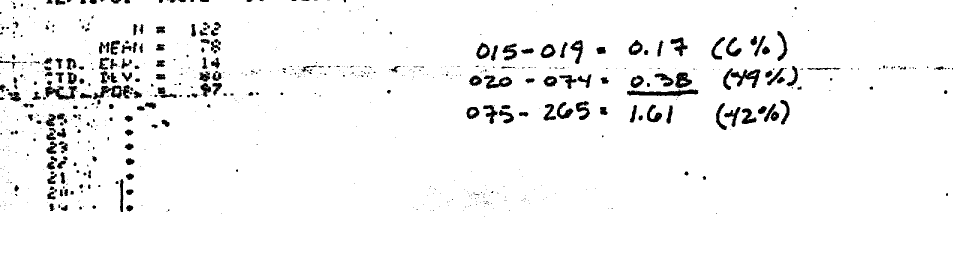
```
        N =  123
     MEAN =  184
STD. ERR. =   13
STD. DEV. =   77
PCT. POP. =   98
```

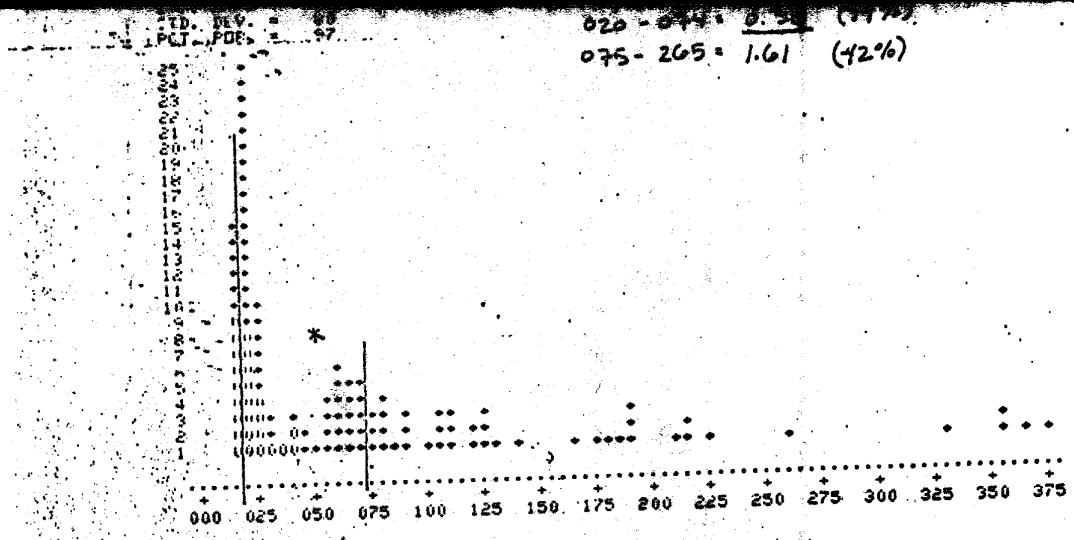


12/11/81 18892 50 1210' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

```
        N =  122
     MEAN =   78
STD. ERR. =   14
STD. DEV. =   80
PCT. POP. =   97
```

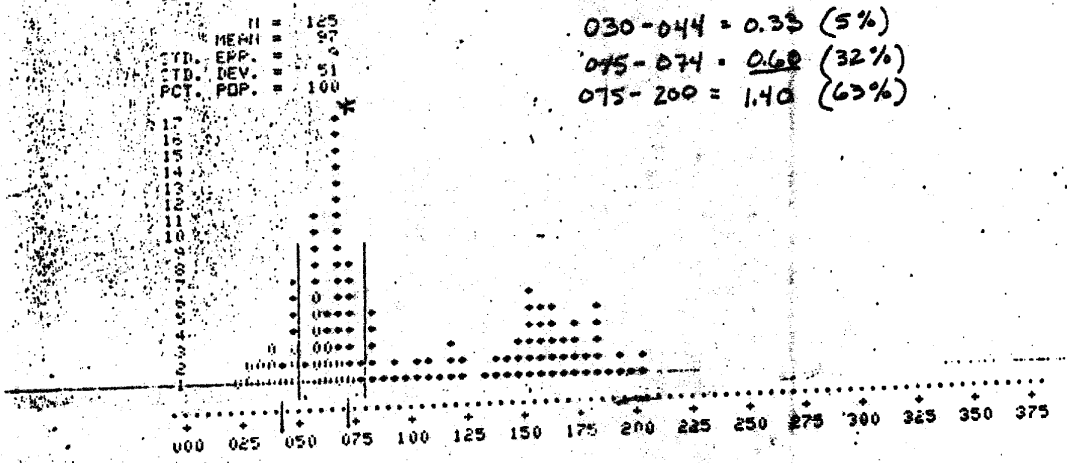
015-019 = 0.17 (6%)
020-074 = 0.38 (49%)
075-265 = 1.61 (42%)





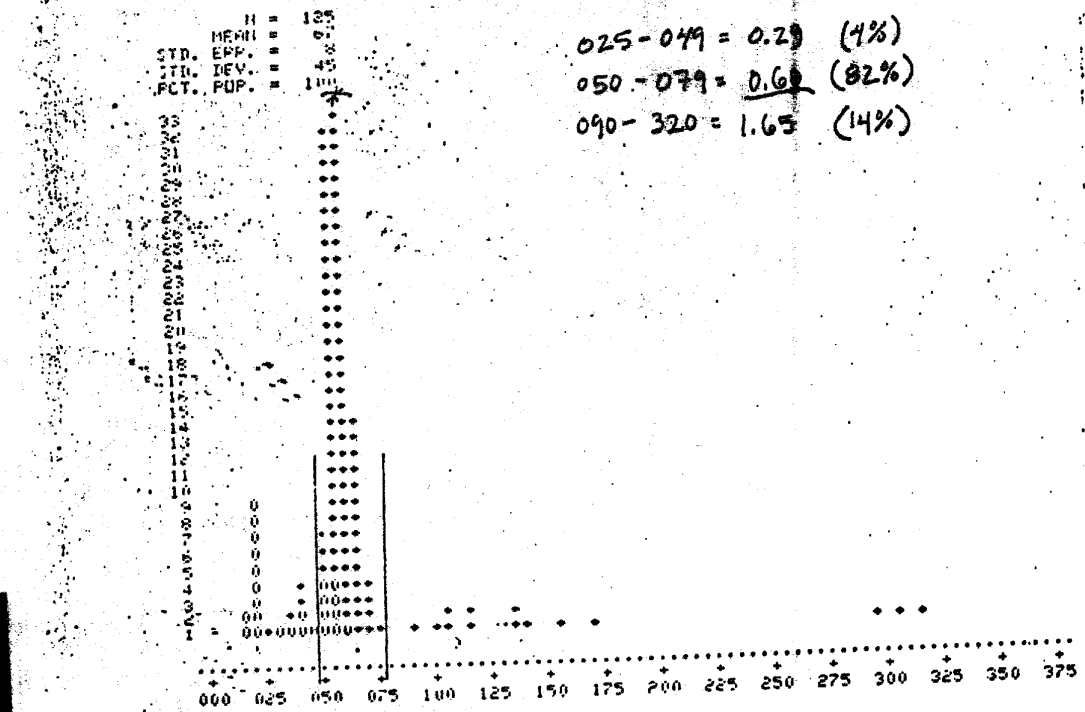
020 - 044 = 0.2 (11%)
075 - 265 = 1.61 (42%)

12/11/81 18893 50 1500' 4 PAN AM NAPATUK CREEK #1 BETHEL, ALASKA



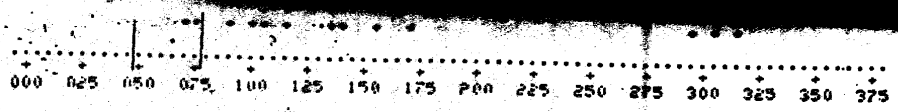
030 - 044 = 0.33 (5%)
045 - 074 = 0.68 (32%)
075 - 200 = 1.40 (63%)

12/11/81 18894 50 1800' 4 PAN AM NAPATUK CREEK #1 BETHEL, ALASKA



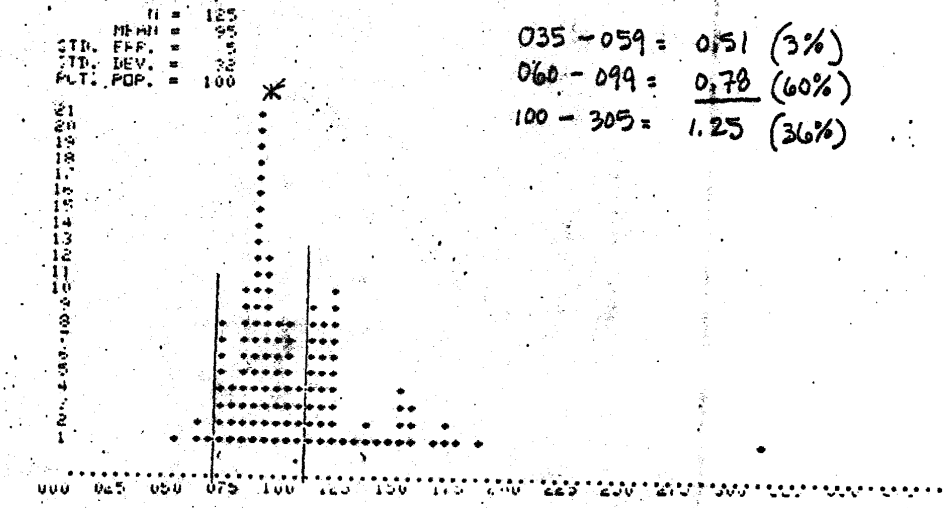
025 - 049 = 0.29 (4%)
050 - 079 = 0.69 (82%)
090 - 320 = 1.65 (14%)

TERTIARY / CRETACEOUS BOUNDARY



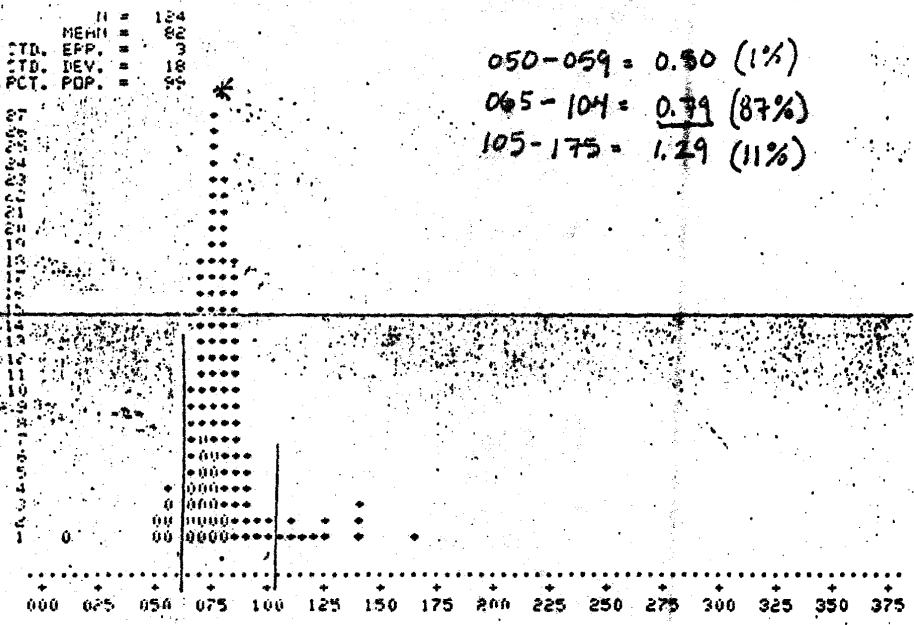
TERTIARY / CRETACEOUS BOUNDARY

12/11/81 18895 50 2130' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA



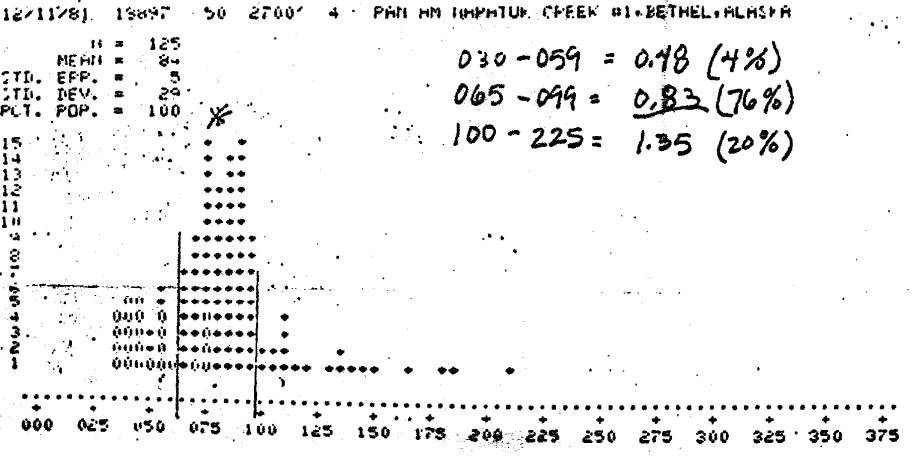
035 - 059 = 0.51 (3%)
060 - 099 = 0.78 (60%)
100 - 305 = 1.25 (36%)

12/11/81 18896 50 2400' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

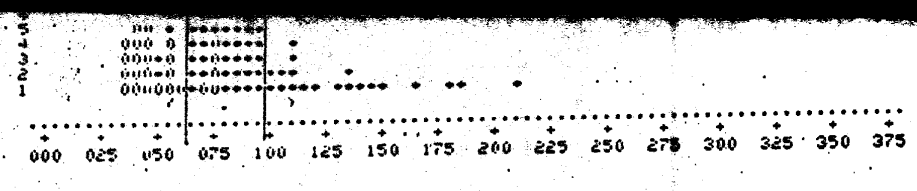


050 - 059 = 0.80 (1%)
065 - 104 = 0.79 (87%)
105 - 175 = 1.29 (11%)

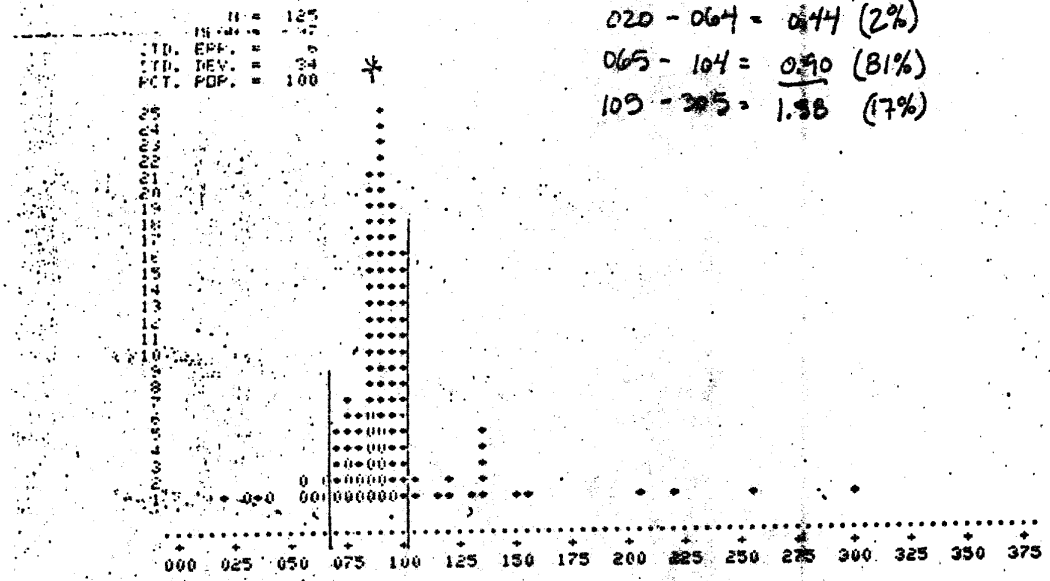
12/11/81 18897 50 2700' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA



030 - 059 = 0.98 (4%)
065 - 099 = 0.83 (76%)
100 - 225 = 1.35 (20%)

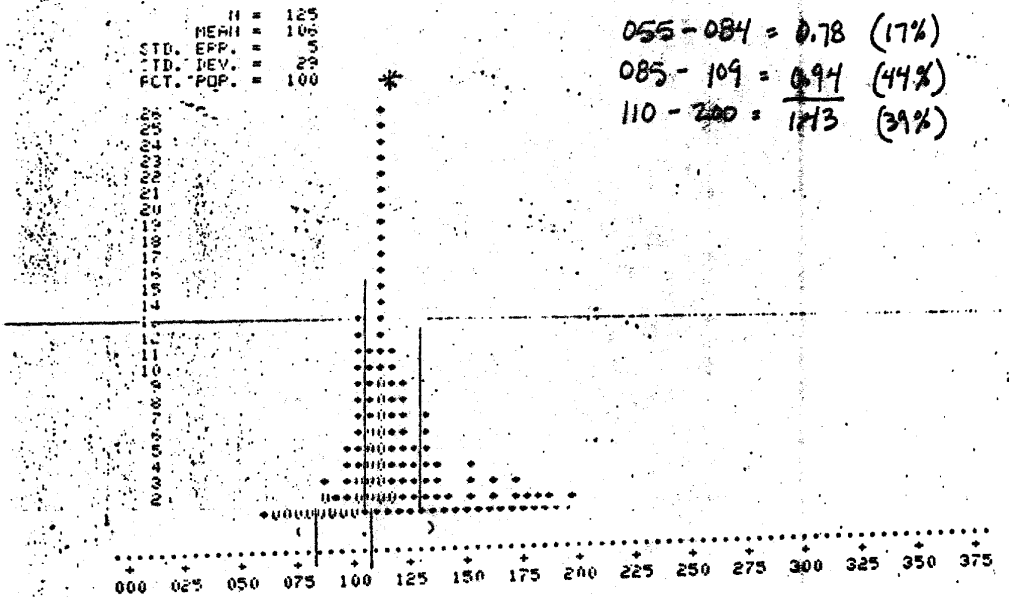


12/11/81 18898 50 3000' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA



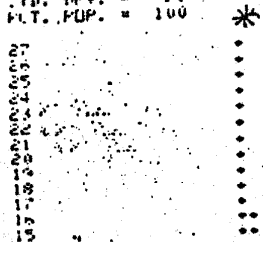
020 - 064 = 0.44 (2%)
065 - 104 = 0.90 (81%)
105 - 305 = 1.58 (17%)

12/11/81 18899 50 3300' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

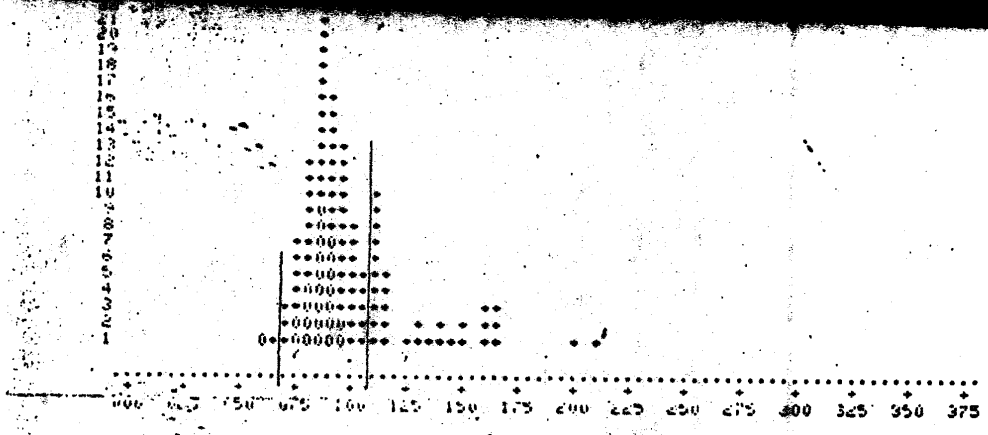


055 - 084 = 0.78 (17%)
085 - 109 = 0.94 (44%)
110 - 200 = 1.13 (39%)

12/11/81 18900 50 3600' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA



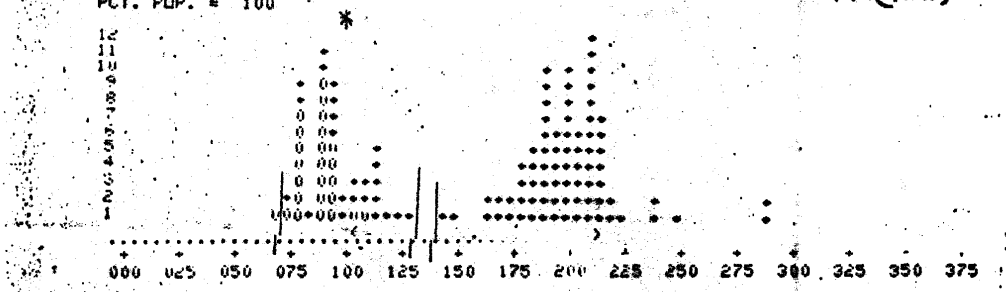
055 - 069 = 0.66 (1%)
070 - 109 = 0.89 (67%)
110 - 225 1.36 (32%)



12/11/81 18901 50 3900' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 156
STD. ERR. = 9
STD. DEV. = 55
PCT. POP. = 100

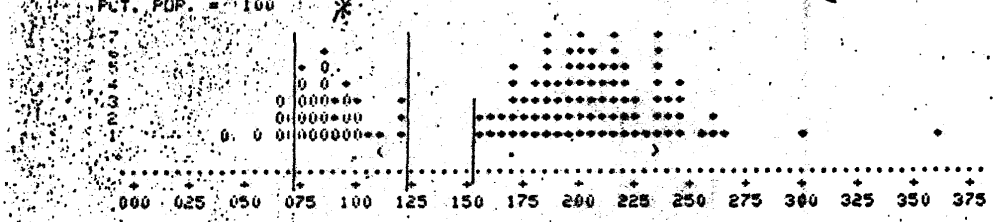
070 - 129 = 0.92 (24%)
139 - 2.90 = 1.97 (76%)



12/11/81 18902 50 4200' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 174
STD. ERR. = 11
STD. DEV. = 62
PCT. POP. = 100

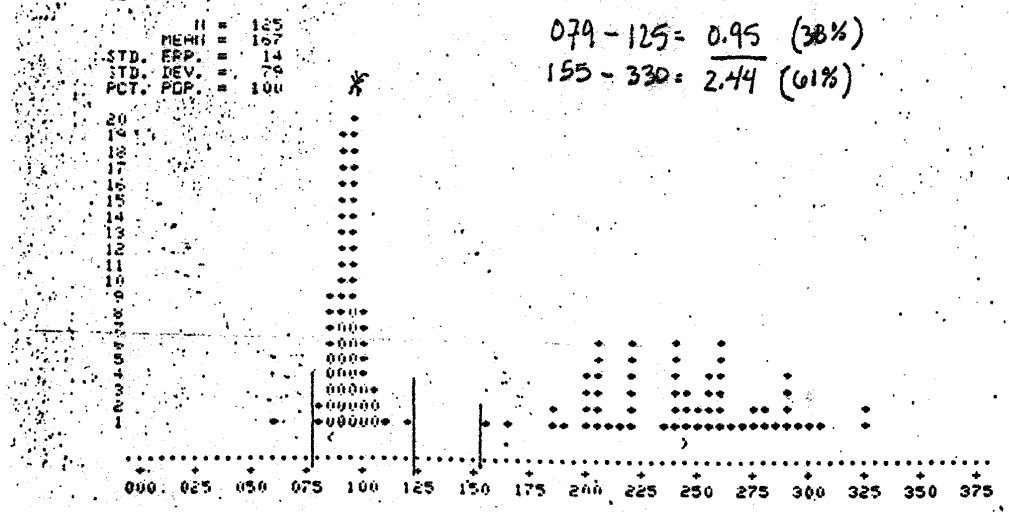
075 - 124 = 0.93 (11%)
155 - 375 = 2.10 (89%)

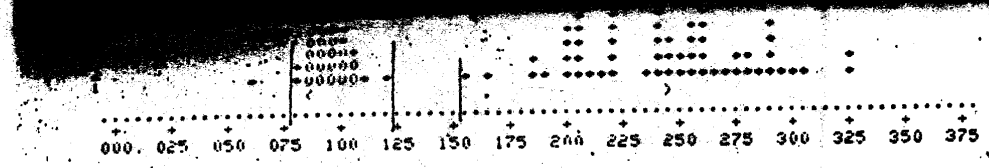


12/11/81 18903 50 4500' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 167
STD. ERR. = 14
STD. DEV. = 79
PCT. POP. = 100

079 - 125 = 0.95 (38%)
155 - 330 = 2.44 (61%)

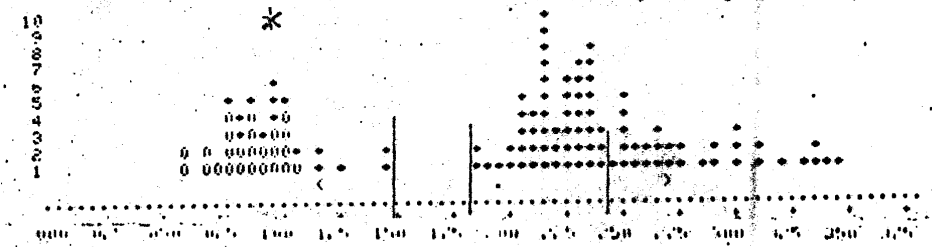




12/11/81 18904 50 4800' 4 PAN AM NIMPATUK CREEK #1, BETHEL, ALASKA

N = 123
MEAN = 195
STD. ERR. = 13
STD. DEV. = 78
PCT. POP. = 98

050 - 149 = 0.92 (15%)
185 - 244 = 1.65 (67%)
245 - 350 = 2.89 (31%)

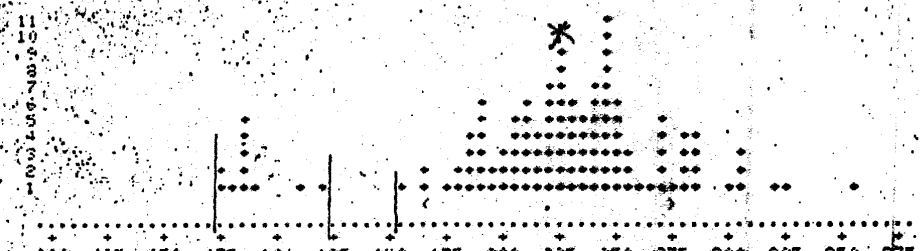


WELDED TUFF 5000' - 5300'

12/11/81 18905 50 5100' 4 PAN AM NIMPATUK CREEK #1, BETHEL, ALASKA

N = 124
MEAN = 222
STD. ERR. = 9
STD. DEV. = 53
PCT. POP. = 99

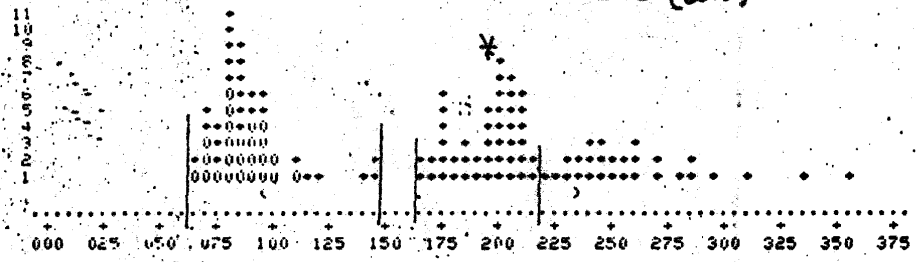
075 - 125 = 0.90 (8%)
155 - 360 = 2.25 (89%)



12/11/81 18906 50 5400' 4 PAN AM NIMPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 167
STD. ERR. = 12
STD. DEV. = 72
PCT. POP. = 100

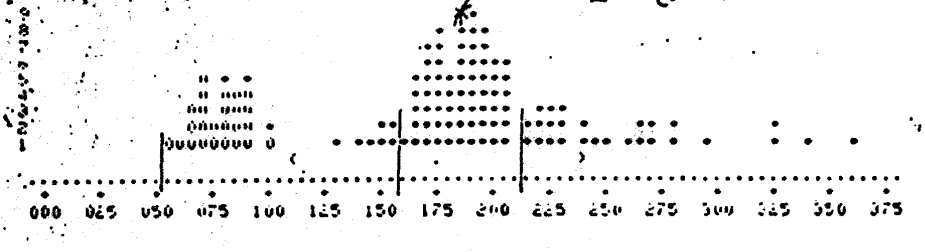
065 - 149 = 0.90 (27%)
165 - 219 = 1.95 (45%)
220 - 360 = 2.62 (28%)

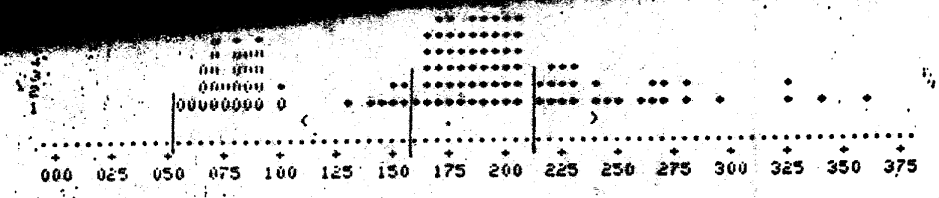


12/11/81 18907 50 5730' 4 PAN AM NIMPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 176
STD. ERR. = 11
STD. DEV. = 84
PCT. POP. = 100

055 - 159 = 0.93 (10%)
160 - 209 = 1.86 (63%)
210 - 375 = 2.60 (27%)

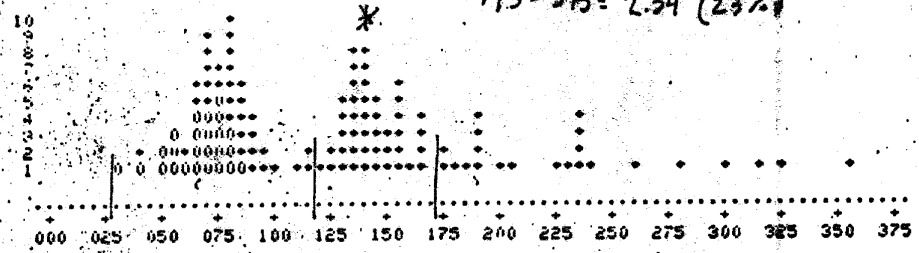




12/11/81 1849B 50 6000' 4 PAN AM NAPATUK CREEK #1 [illegible] ALASKA

N = 104
MEAN = 129
STD. ERR. = 11
STD. DEV. = 63
PCT. POP. = 99

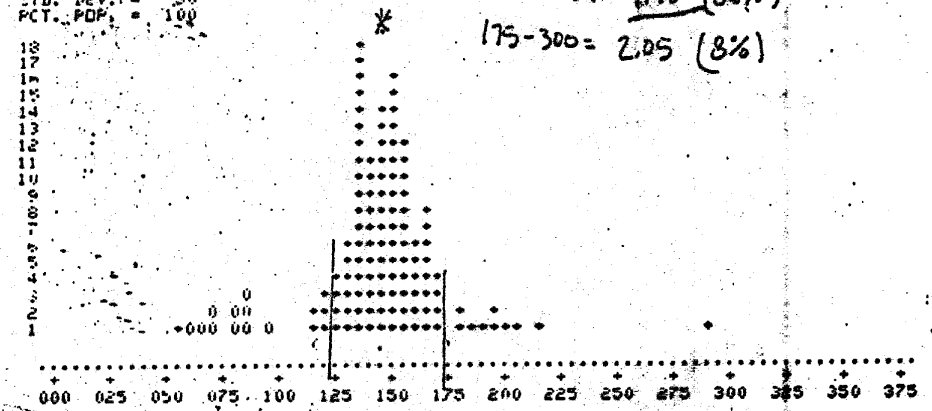
050-119 = 0.76 (33%)
120-174 = 1.44 (43%)
175-375 = 2.34 (23%)



12/11/81 1849B 50 6200' 4 PAN AM NAPATUK CREEK #1 BETHEL ALASKA

N = 125
MEAN = 145
STD. ERR. = 5
STD. DEV. = 30
PCT. POP. = 100

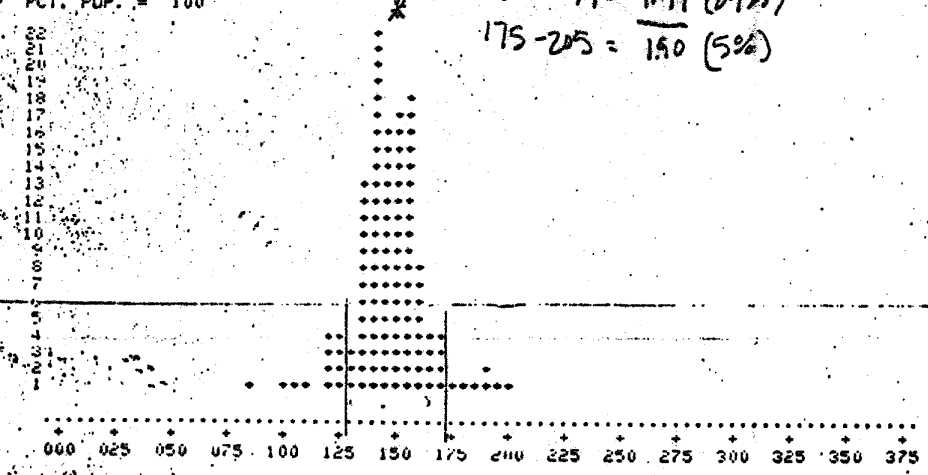
050-124 = 0.91 (5%)
125-174 = 1.48 (86%)
175-300 = 2.05 (8%)



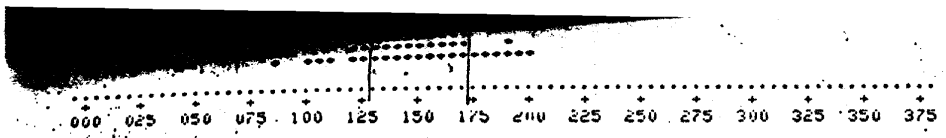
12/11/81 1849B 50 6600' 4 PAN AM NAPATUK CREEK #1 BETHEL ALASKA

N = 124
MEAN = 148
STD. ERR. = 3
STD. DEV. = 17
PCT. POP. = 100

075-129 = 4.17 (9%)
130-174 = 1.49 (84%)
175-205 = 1.90 (5%)



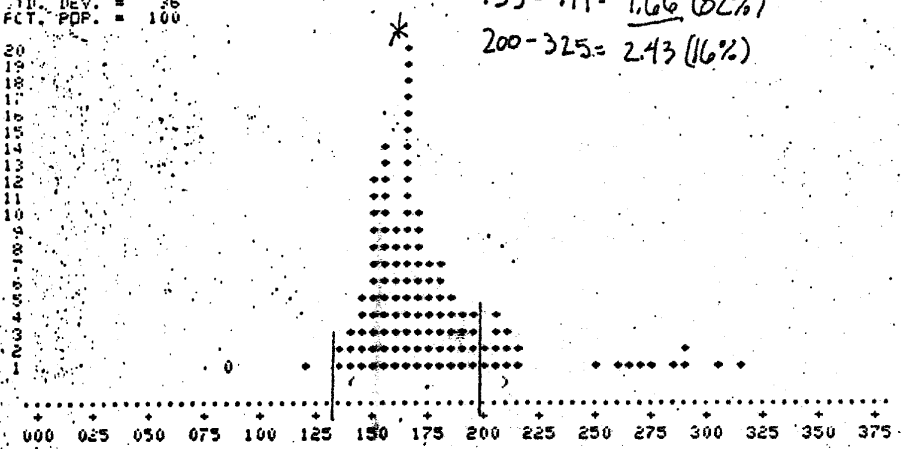
12/11/81 1849B 50 6810' 4 PAN AM NAPATUK CREEK #1 BETHEL ALASKA



12/11/81 18911 50 6910' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 125
MEAN = 178
STD. ERR. = 6
STD. DEV. = 36
PCT. POP. = 100

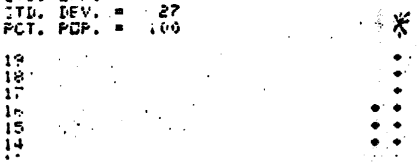
075 - 125 = 1.06 (0%)
135 - 199 = 1.66 (82%)
200 - 325 = 2.43 (16%)



12/11/81 18912 50 7200' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 125
MEAN = 164
STD. ERR. = 4
STD. DEV. = 27
PCT. POP. = 100

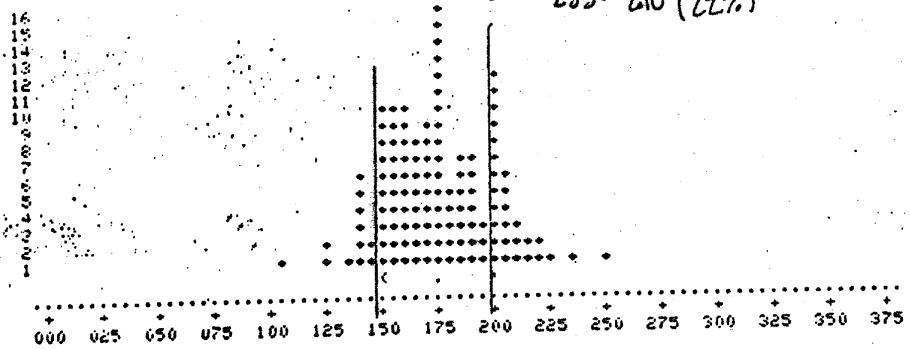
050 - 139 = 1.12 (9%)
140 - 199 = 1.66 (84%)
200 - 250 = 2.21 (6%)



12/11/81 18914 50 7800' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 125
MEAN = 177
STD. ERR. = 4
STD. DEV. = 24
PCT. POP. = 100

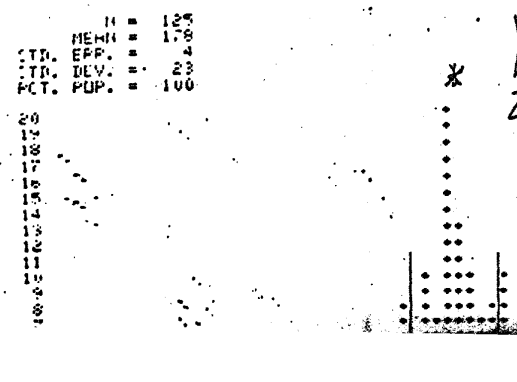
100 - 149 = 1.37 (9%)
150 - 199 = 1.71 (68%)
200 - 255 = 2.10 (22%)

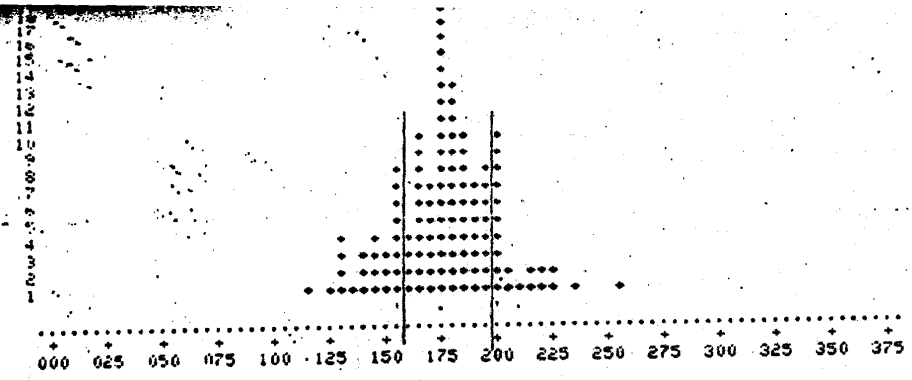


12/11/81 18915 50 8100' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 125
MEAN = 178
STD. ERR. = 4
STD. DEV. = 23
PCT. POP. = 100

110 - 159 = 1.45 (20%)
160 - 199 = 1.80 (63%)
200 - 260 = 2.12 (16%)

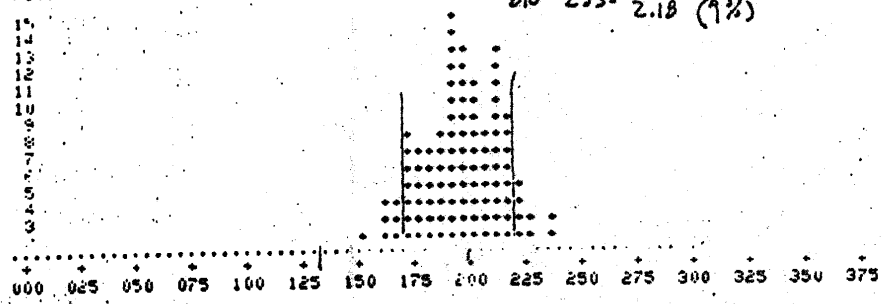




12/11/81 18916 50 8400' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 184
STD. ERR. = 3
STD. DEV. = 20
PCT. POP. = 100

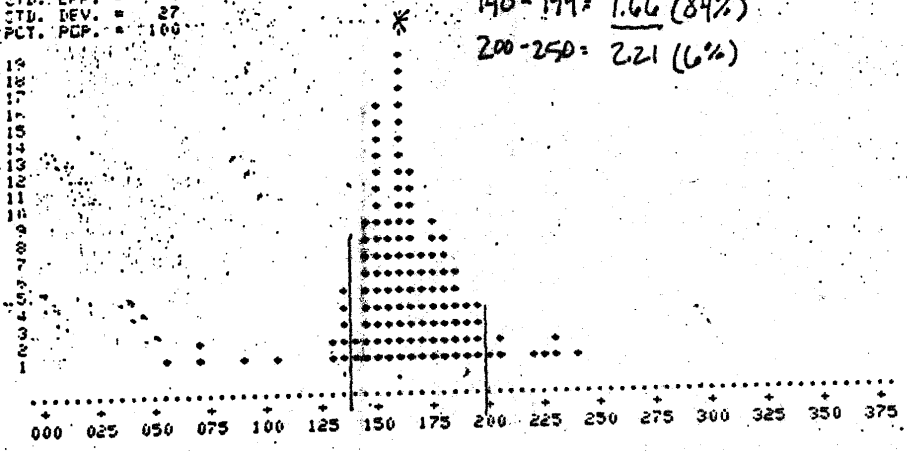
120-159 = 1.47 (11%)
160-209 = 1.86 (79%)
210-235 = 2.18 (9%)



12/11/81 18912 50 7200' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 164
STD. ERR. = 4
STD. DEV. = 27
PCT. POP. = 100

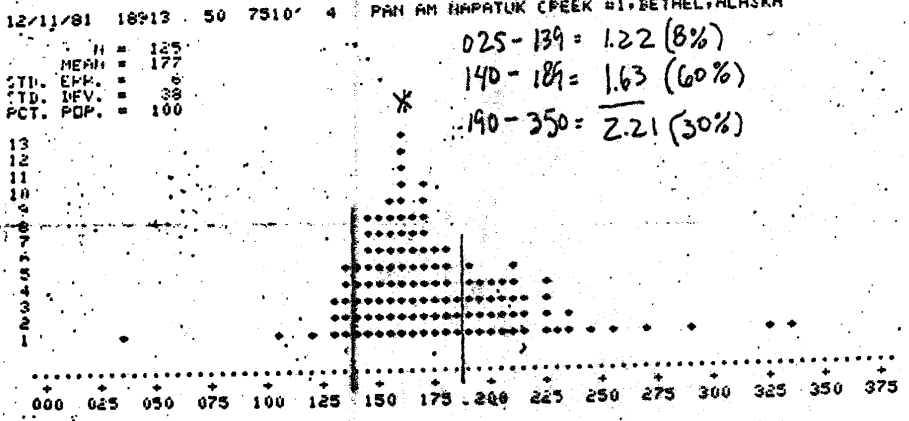
050-139 = 1.12 (9%)
140-199 = 1.66 (84%)
200-250 = 2.21 (6%)

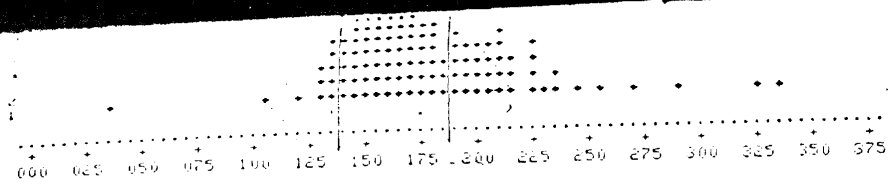


12/11/81 18913 50 7510' 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 177
STD. ERR. = 6
STD. DEV. = 38
PCT. POP. = 100

025-139 = 1.22 (8%)
140-189 = 1.63 (60%)
190-350 = 2.21 (30%)

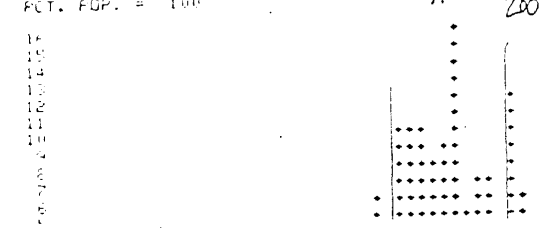




12/11/81 1814 50 7800' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

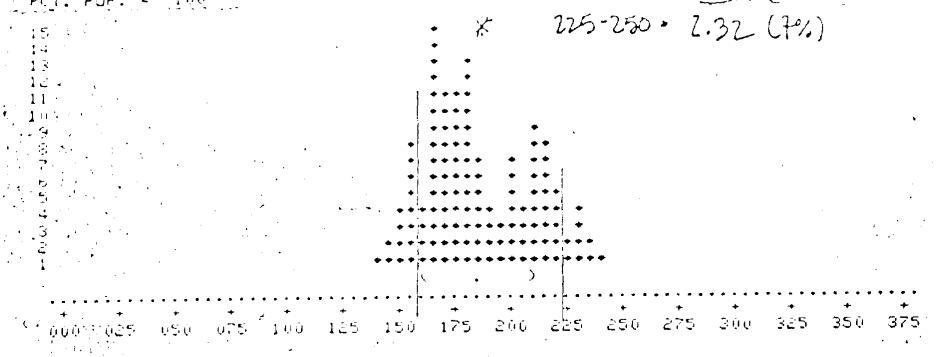
N = 165
MEAN = 177
STD. ERR. = 4
STD. DEV. = 24
PCT. POP. = 100

100-149 = 1.37 (9%)
150-199 = 1.71 (68%)
200-255 = 2.10 (22%)



N = 167
MEAN = 187
STD. ERR. = 4
STD. DEV. = 23
PCT. POP. = 100

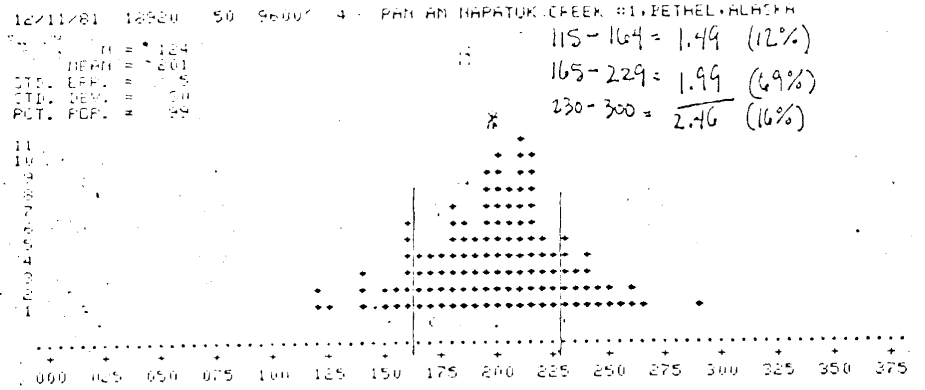
160-224 = 1.88 (80%)
225-250 = 2.32 (7%)



12/11/81 1820 50 9600' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 124
MEAN = 201
STD. ERR. = 5
STD. DEV. = 30
PCT. POP. = 99

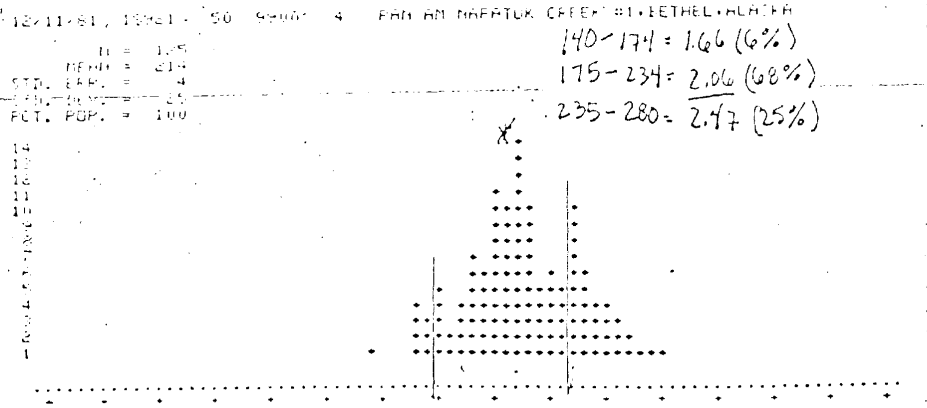
115-164 = 1.49 (12%)
165-229 = 1.99 (69%)
230-300 = 2.46 (16%)

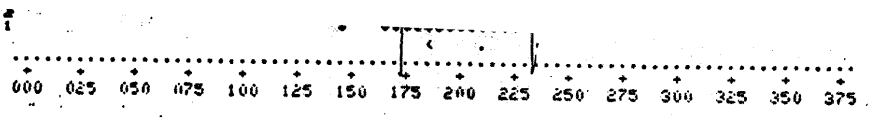


12/11/81 1941 50 9900' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 145
MEAN = 214
STD. ERR. = 4
STD. DEV. = 25
PCT. POP. = 100

140-174 = 1.66 (6%)
175-234 = 2.06 (68%)
235-280 = 2.47 (25%)

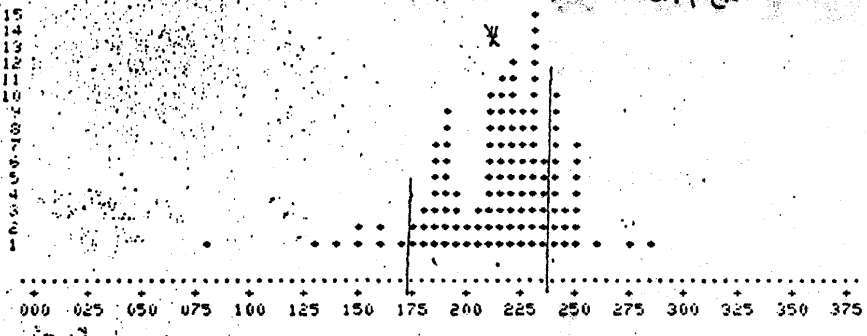




12/11/81 13922 50 102000 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 124
MEAN = 215
STD. ERR. = 4
STD. DEV. = 28
PCT. POP. = 99

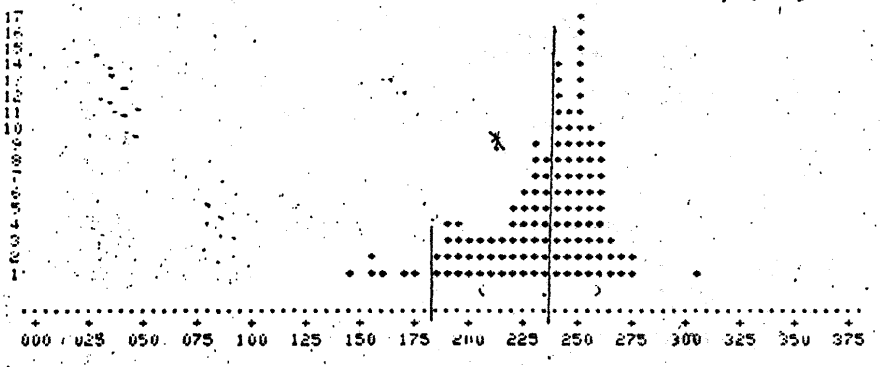
075-174 = 1.44 (6%)
175-239 = 2.13 (94%)
240-290 = 2.49 (18%)



12/11/81 13427 50 10500' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 125
MEAN = 235
STD. ERR. = 4
STD. DEV. = 27
PCT. POP. = 100

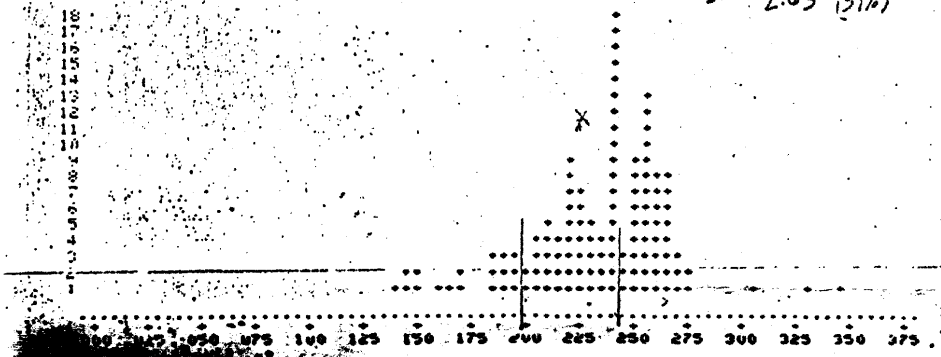
140-179 = 1.61 (4%)
180-239 = 2.18 (40%)
240-310 = 2.54 (55%)



12/11/81 18924 50 10800' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 125
MEAN = 234
STD. ERR. = 5
STD. DEV. = 33
PCT. POP. = 100

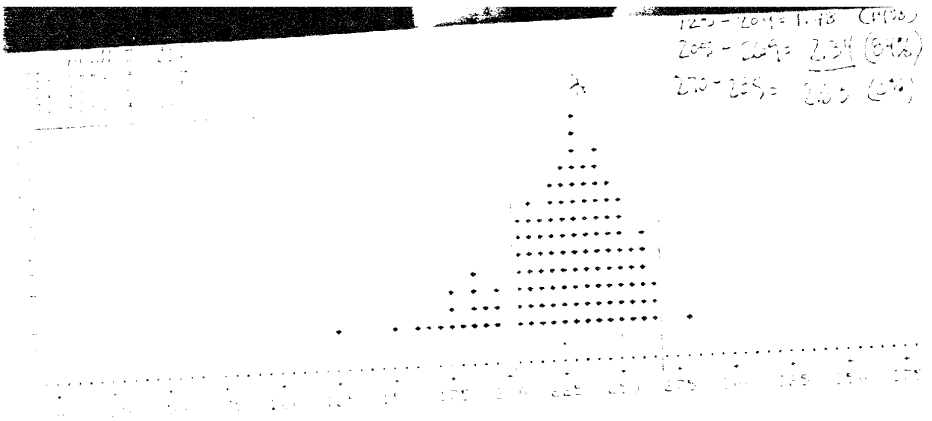
135-199 = 1.73 (14%)
200-244 = 2.27 (46%)
245-350 = 2.63 (39%)

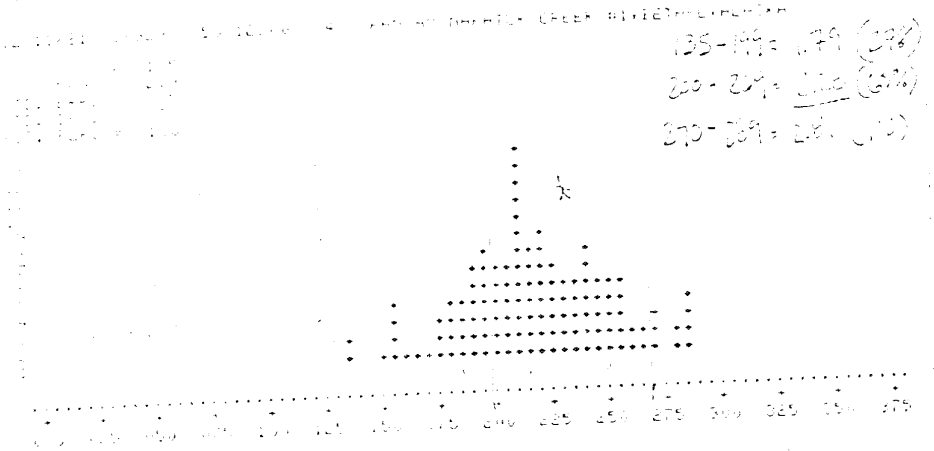


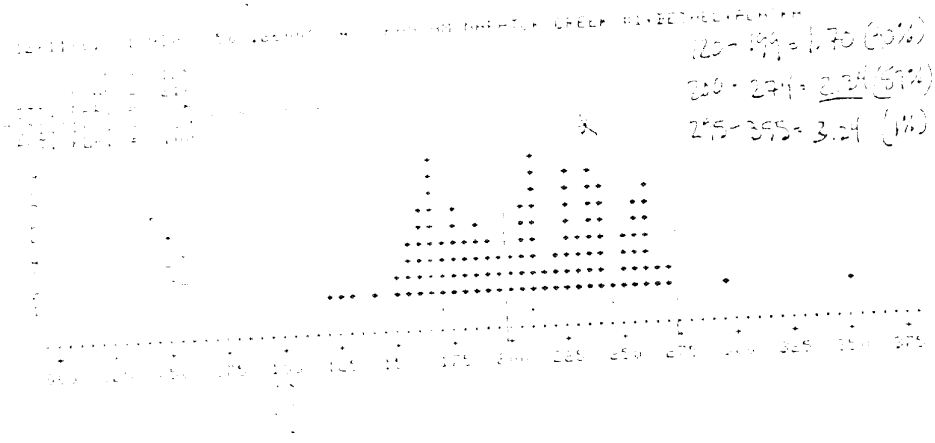
12/11/81 18925 50 11000' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

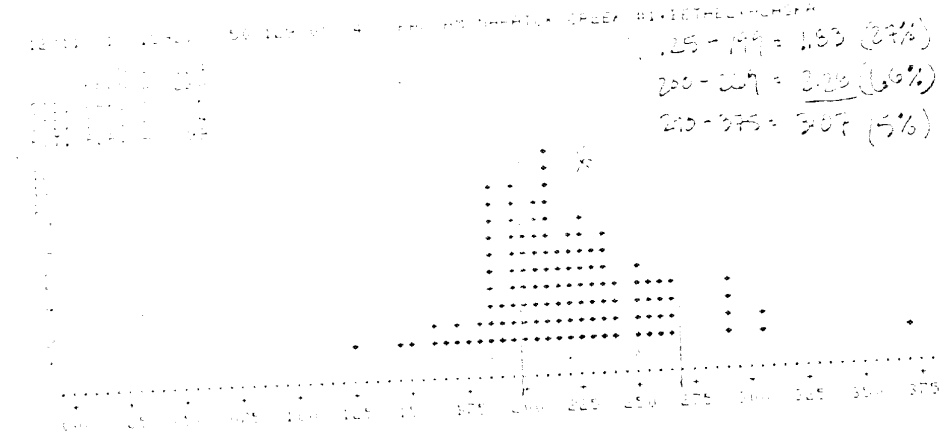
N = 124
MEAN = 244
STD. ERR. = 5
STD. DEV. = 41
PCT. POP. = 99

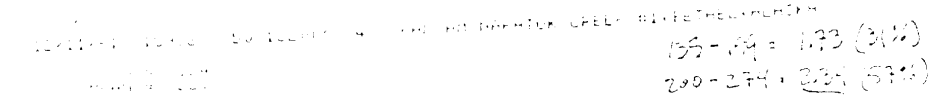
075-174 = 1.44 (6%)
175-239 = 2.13 (94%)
240-290 = 2.49 (18%)

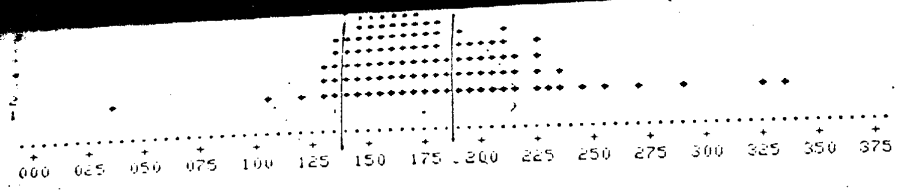

125 - 204 = 1.78 (44%)
205 - 269 = 2.34 (54%)
270 - 285 = 2.5 (2%)


135 - 199 = 1.79 (32%)
200 - 269 = 3.02 (62%)
270 - 289 = 2.8 (6%)


125 - 199 = 1.70 (39%)
200 - 274 = 2.34 (57%)
275 - 395 = 3.24 (4%)


125 - 199 = 1.83 (34%)
200 - 269 = 3.02 (60%)
270 - 375 = 3.07 (6%)

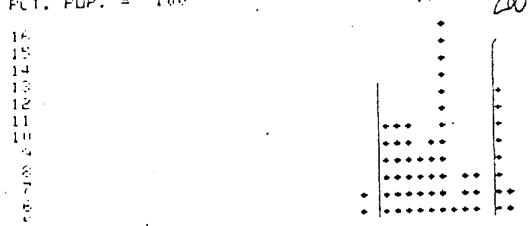

135 - 199 = 1.73 (31%)
200 - 274 = 2.35 (59%)



12/11/81 1814 50 7800' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

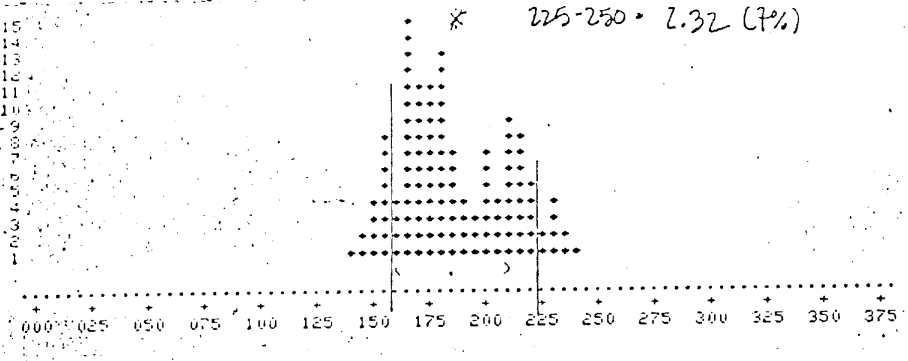
N = 185
MEAN = 177
STD. ERR. = 4
STD. DEV. = 24
PCT. POP. = 100

100-149 = 1.37 (9%)
150-199 = 1.71 (68%)
200-255 = 210 (22%)



MEAN = 187
STD. ERR. = 4
STD. DEV. = 23
PCT. POP. = 100

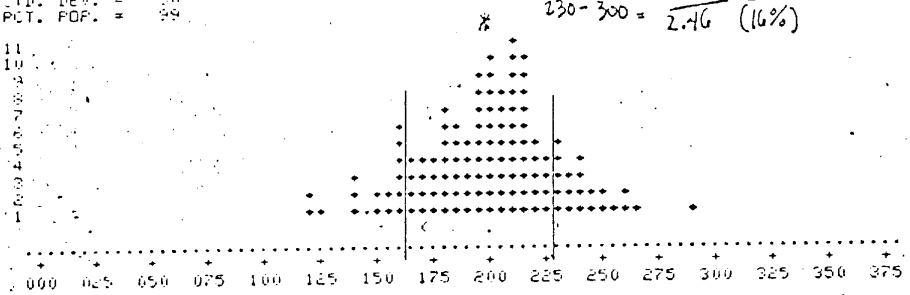
160-224 = 1.88 (80%)
225-250 = 2.32 (7%)



12/11/81 1820 50 9600' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 184
MEAN = 201
STD. ERR. = 5
STD. DEV. = 20
PCT. POP. = 99

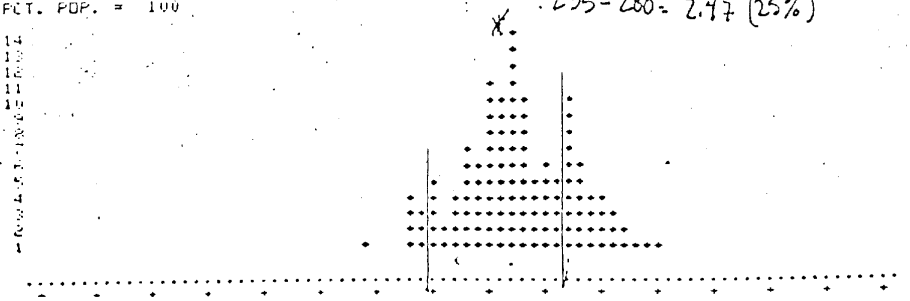
115-164 = 1.49 (12%)
165-229 = 1.99 (69%)
230-300 = 2.46 (16%)

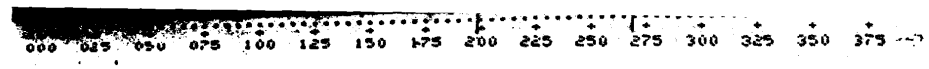


12/11/81 1821 50 9900' 4 PAN AM NAPATUK CREEK #1,BETHEL,ALASKA

N = 185
MEAN = 214
STD. ERR. = 4
STD. DEV. = 25
PCT. POP. = 100

140-174 = 1.66 (6%)
175-234 = 2.06 (68%)
235-280 = 2.47 (25%)

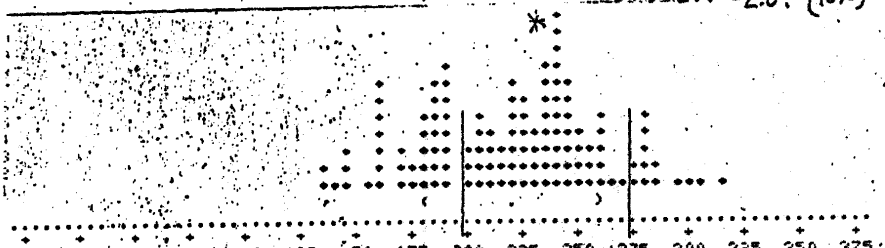




/11/81 18932 50 132000 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 124
MEAN = 221
D. ERR. = 6
D. DEV. = 39
T. POP. = 99

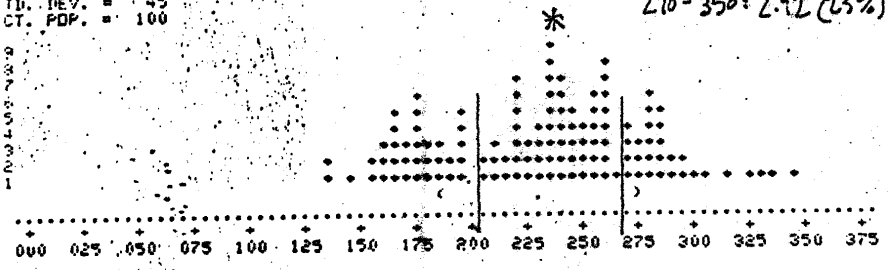
135-199 = 1.73 (31%)
200-274 = 2.34 (57%)
275-319 = 2.89 (10%)



2/11/81 18933 50 139500 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 233
TD. ERR. = 8
TD. DEV. = 45
CT. POP. = 100

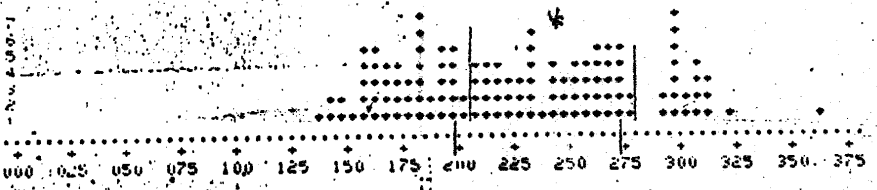
135-199 = 1.74 (28%)
200-269 = 2.39 (48%)
270-350 = 2.92 (23%)



2/11/81 18934 50 138000 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 125
MEAN = 221
TD. ERR. = 8
TD. DEV. = 50
CT. POP. = 100

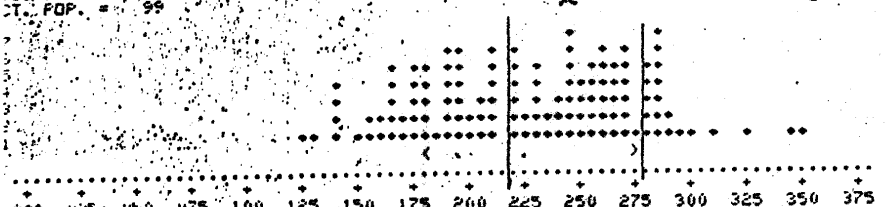
130-199 = 1.69 (38%)
200-274 = 2.37 (45%)
285-360 = 3.00 (16%)



2/11/81 18935 50 141000 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 124
MEAN = 228
TD. ERR. = 8
TD. DEV. = 47
CT. POP. = 99

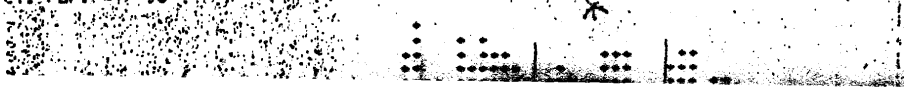
125-214 = 1.76 (48%)
215-279 = 2.45 (36%)
280-355 = 3.00 (16%)



2/11/81 18936 50 144000 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

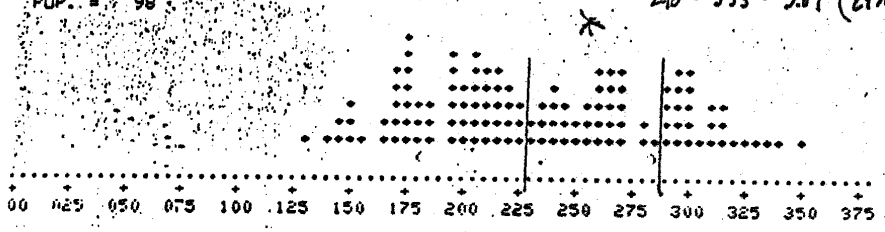
N = 123
MEAN = 239
TD. ERR. = 9
TD. DEV. = 52
CT. POP. = 98

130-229 = 1.96 (48%)
230-289 = 2.57 (28%)
290-355 = 3.09 (21%)



EPP. = 52
DEV. = 98

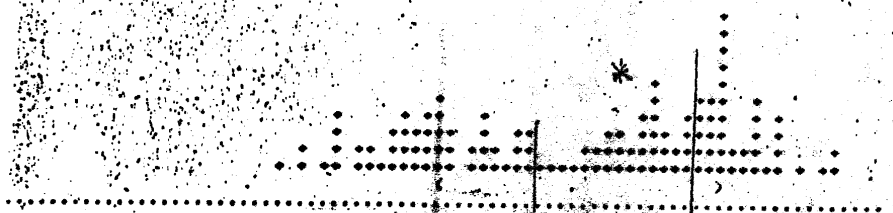
290 - 355 = 3.09 (21%)



11/81 13937 50 14700 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

N = 123
MEAN = 249
EPP. = 11
DEV. = 64
POP. = 98

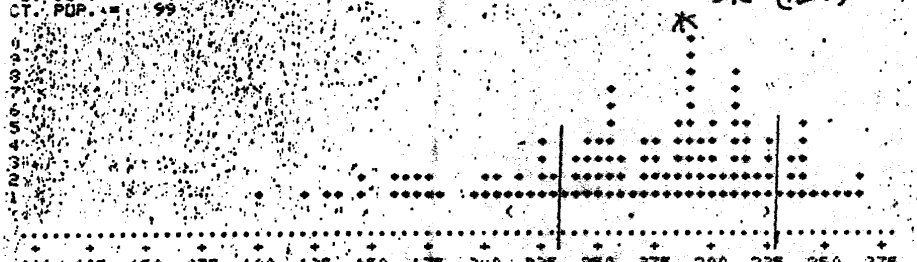
115 - 229 = 1.80 (40%)
230 - 299 = 2.72 (28%)
300 - 365 = 3.20 (30%)



11/81 13938 50 14870 4 PAN AM NAPATUK CREEK #1, BETHEL, ALASKA

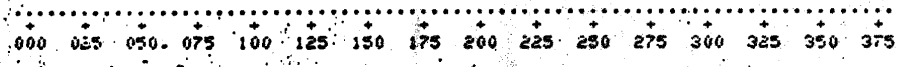
N = 124
MEAN = 269
STD. EPP. = 10
STD. DEV. = 58
PCT. POP. = 99

100 - 234 = 1.86 (21%)
235 - 329 = 2.85 (62%)
330 - 370 = 3.76 (12%)



EOT

N = 0
MEAN = 0
STD. EPP. = 0
STD. DEV. = 0
PCT. POP. = 0



**COMMAND =