UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Isoreflectance map of the J Sandstone in the Denver basin of Colorado

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

USGS, Denver, CO 80225

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TABLE OF CONTENTS

Page
Introduction.. 1
Method of analysis.................................... 1
Regional setting...................................... 4
Vitrinite reflectance trends.......................... 6
Summary... 8
References.. 9

PLATES

Plate 1. Isoreflectance map of the J Sandstone in the Denver basin of Colorado................Back pocket

ILLUSTRATIONS

Figure 1. Index map of the Denver basin study area...... 2
2. Generalized stratigraphic column for the Denver basin.................................. 5
3. Linear regression of vitrinite reflectance versus depth................................. 7

TABLES

Table 1. Locations of sampled core holes and outcrops... 3

APPENDICES

Appendix A. Vitrinite reflectance histograms........... 10

INTRODUCTION

The Denver basin of Colorado, Wyoming, and Nebraska is one of the major petroleum producing areas of the Rocky Mountain Region. Hydrocarbons are produced primarily from Cretaceous age rocks in this structural basin. More than 800 million barrels of oil have been produced from the Denver basin, primarily from the Lower Cretaceous J Sandstone (Tainter, 1984). The J Sandstone is composed of sandstone and shale of marine to deltaic origin. Production is primarily from stratigraphic accumulations in deltaic distributary channel sandstones. An example of production from distributary channels is the Peoria field, located approximately 40 mi. east of Denver (fig. 1). Oil is produced from 15 to 50 ft. thick sandstones of the middle part of J Sandstone (Weimer, Cooper, 1978). Gas is also produced from the J Sandstone. The Wattenburg gas field, located north of Denver (fig. 1), contains at least 1.1 trillion cubic feet (TCF) of gas in delta-front sandstones (Matuszczak, 1973). This field is situated in the deepest part of the Colorado portion of the Denver basin, at depths of more than 8000 ft.

Knowledge of conditions under which hydrocarbons are generated and emplaced is important both to a regional understanding of the basin geology and for continued exploration success. Vitrinite reflectance is an important tool for determining the level of thermal maturity of a petroliferous basin. The degree of thermal maturation of a rock unit is indicated by the percent vitrinite reflectance (R_o) value. The level of thermal maturity may indicate whether organic matter in potential source rocks has been heated sufficiently for the generation of hydrocarbons. In liquid-prone types of organic matter, an R_o range of 0.6 to 1.35 is generally considered to be in the zone of intense oil generation (Waples, 1980). The existence of anomalous paleoheat flows and of lateral migration of hydrocarbons may also be indicated by the degree of thermal maturation.

A thermal maturity contour map of the major hydrocarbon producing area of the basin in Colorado was constructed using R_o data measured from shales collected from J Sandstone cores and outcrops. The study area is indicated in figure 1, also shown is the basin structure on the top of Precambrian rocks. The purpose of this report is to provide a thermal maturity map of the J Sandstone in the Denver basin and to briefly discuss the thermal maturity as it relates to the thermal and burial history of this formation (plate 1).

METHOD OF ANALYSIS

Carbonaceous shales and coals from the J Sandstone and/or adjacent marine shales were sampled from 26 core holes and 12 outcrop locations. Duplicate or triplicate samples were taken at each location. Histograms of percent R_o for replicate samples at each site were compared and the median or best-fit R_o was used for table 1 and the map. Table 1 lists the well names, well and outcrop locations,

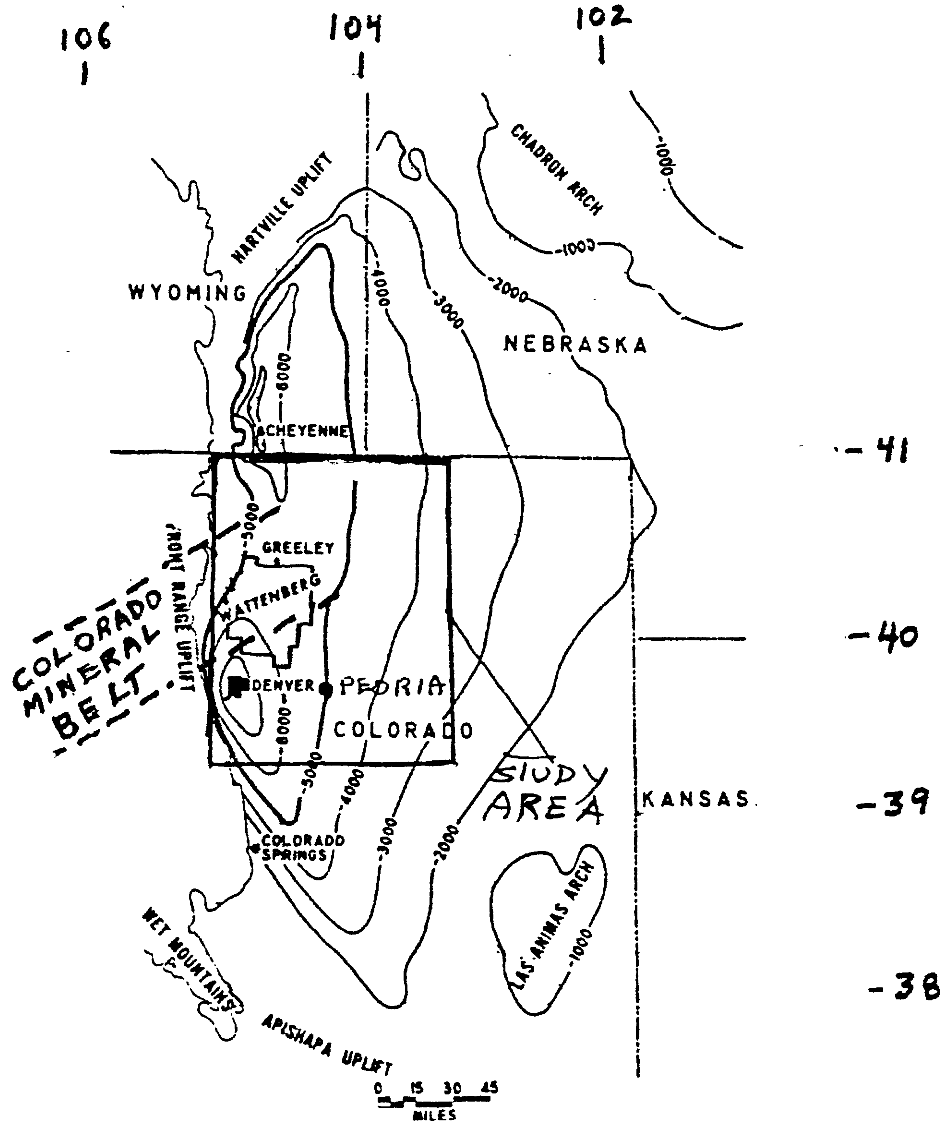
106
104
102
CHADRON ARCH
-1000-
-1000-
HARTVILLE UPLIFT
WYOMING
-4000
-3000
-2000
NEBRASKA
-6000
CHEYENNE
-41
-5000
GREELEY
WATTENBERG
FRONT RANGE UPLIFT
COLORADO MINERAL BELT
-40
DENVER
PEORIA
-8000
COLORADO
STUDY AREA
KANSAS
-39
-5000
-4000
COLORADO SPRINGS
-3000
-2000
LAS ANIMAS ARCH
-1000
-38
WET MOUNTAINS
APISHAPA UPLIFT
0 15 30 45
MILES

Figure 1. Index map of the study area in the Denver basin of Colorado showing structure contours at the top of the Precambrian(Matuszczak, 1973).

Table 1

Locations of sampled core holes and outcrops [*--outcrop sample]

Sample Number	Well name	Location Twn	Rng	Sec	1/4	Pct. R_o	Depth(ft.) J Sst top
1	Doll Unit 1-35	1N	58W	35	NWSE	0.52	5851
2	50 UPRR Pan Am-B	1N	66W	3	SWSW	0.91	7945
3	G. W. Steiber 1	1N	67W	24	SWSW	1.14	8034
4	34 UPRR 1 Amoco	2N	63W	17	NWSW	0.81	7333
5	1 Osman	2N	66W	28		1.51	7868
6	1 Dutcher Unit	2N	67W	24	SWSW	1.25	7948
7	E. Max Serafini	2N	68W	16	CSW	1.10	7890
8	1 Matushima	3N	67W	35	SWSW	1.31	7805
9	1 Hansen	5N	49W	24	NENE	0.49	4031
10	1 Fagg	5N	56W	6	NWNE	0.57	5781
11	36 UPRR 1	5N	64W	36		1.05	7170
12	Segeike 1	6N	54W	30	NWSW	0.41	4974
13	1 R. A. Reid	6N	68W	13	SWNE	0.80	7450
14	Champlin 343 Amoco A 1	8N	64W	15	NWSW	0.65	7856
15	Roussell 1	11N	54W	20	NWNE	0.48	5343
16	Foster 1	11N	60W	6	NESE	0.64	7544
17	Pence Ranch Co. 1	16N	62W	16	NENE	0.60	7960
18	State 1-16	1S	60W	16	NESW	0.58	6426
19	2 Champlin 117	1S	66W	35	SWSE	0.80	8236
20	E. J. Dahlinger 1	2S	66W	4	SWSW	0.82	8315
21	Scheetz 6	3S	52W	23	SWSW	0.62	4277
22	Callahan 1	3S	63W	2	NENE	0.62	7544
23	Rhodes 'A' 1	4S	58W	26	NENE	0.63	5624
24	1 Anderson-Byrne	5S	65W	23	NENE	0.58	8750
25	1 Story	6S	64W	32	NWNW	0.64	8725
26	Shell 44-8	11S	59W	8		0.67	6160
27	*	2N	71W	36	NENE	1.45	
28	*	2N	71W	36	SE	0.62	
29	*	3N	70W	4	NE	0.68	
30	*	7N	69W	20	SESW	0.38	
31	*	7N	69W	33	SWSW	0.34	
32	*	9N	69W	5	SWSW	0.50	
33	*	1S	71W	12	SENE	0.85	
34	*	2S	71W	12	NENE	0.58	
35	*	4S	70W	14	SWNW	0.40	
36	*	4S	70W	35	SESE	0.50	
37	*	5S	69W	31	NENE	0.68	
38	*	5S	70W	12	NE	0.35	
39	*	6S	69W	4	NWSW	0.64	
40	*	7S	69W	12	SWSW	0.72	

sample depths, and R_o values. Histograms of percent R_o are included in Appendix A.

Samples of coal, shale and mudstone were used in the R analysis. The coal required no preparation other than crushing to about 0.25mm size. Lithologies other than coal were processed to sepaPate organics from the rock matrix, following the techniques of King and others (1963), and Saxby (1970).

The slides were analyzed under oil immersion with reflected light at 500 magnification. Each sample of randomly oriented organic matter was scanned and 50 to 75 measurements of reflectance were recorded, if possible. Samples with sparse vitrinite and few R_o readings were not used in the final compilation, other samples from the same location were used instead.

The recognition of acceptable vitrinite was determined by the presence of relict plant structure in the particles, or by sharp angular maceral edges. Weathered kerogen (most of which were from outcrop samples) had slightly rounded edges. Due to potential alteration problems associated with the oxidized samples, the lowest recorded reflection values most closely approximate the true maturation level. This is important when dealing with processed samples where there are several populations of kerogen. Recycled organic matter and inertinite macerals record different reflectance levels than vitrinite and were not included in the study.

REGIONAL SETTING

The Denver basin is an asymmetrical post-depositional structural basin (fig. 1). This north-south trending basin has a gently dipping eastern flank, and a steeply dipping western flank proximal and parallel to the Colorado Front Range. The Lower Cretaceous J Sandstone is present over much of the basin and consists of a series of sandstone and shale units deposited during a regression of the epicontinental sea. This formation is conformably underlain by the Skull Creek Shale and conformably overlain by the Mowry Shale, respectively (Weimer and Land, 1972, Clark, 1978)(fig. 2). The informally named J Sandstone, which crops out along the steeply dipping western flank of the basin, increases from a depth of approximately 4000 ft. on the eastern flank of the basin to more than 8000 ft. near Denver (Irwin, 1977). Uplift and erosion during Tertiary time resulted in removal of an additional 800-1200 ft. or more of overburden from the J Sandstone (Irwin, et al., 1977, Epis and Chapin, 1975, Bryant, 1981).

This J Sandstone is composed of three major sand units separated by shales. Sandstones from sampled sections are light gray to tan and are predominately very-fine to fine-grained. The sandstones are interbedded with laminated and bioturbated carbonaceous shale and mudstone. The J Sandstone crops out near the Precambrian outcrop boundary shown on plate 1.

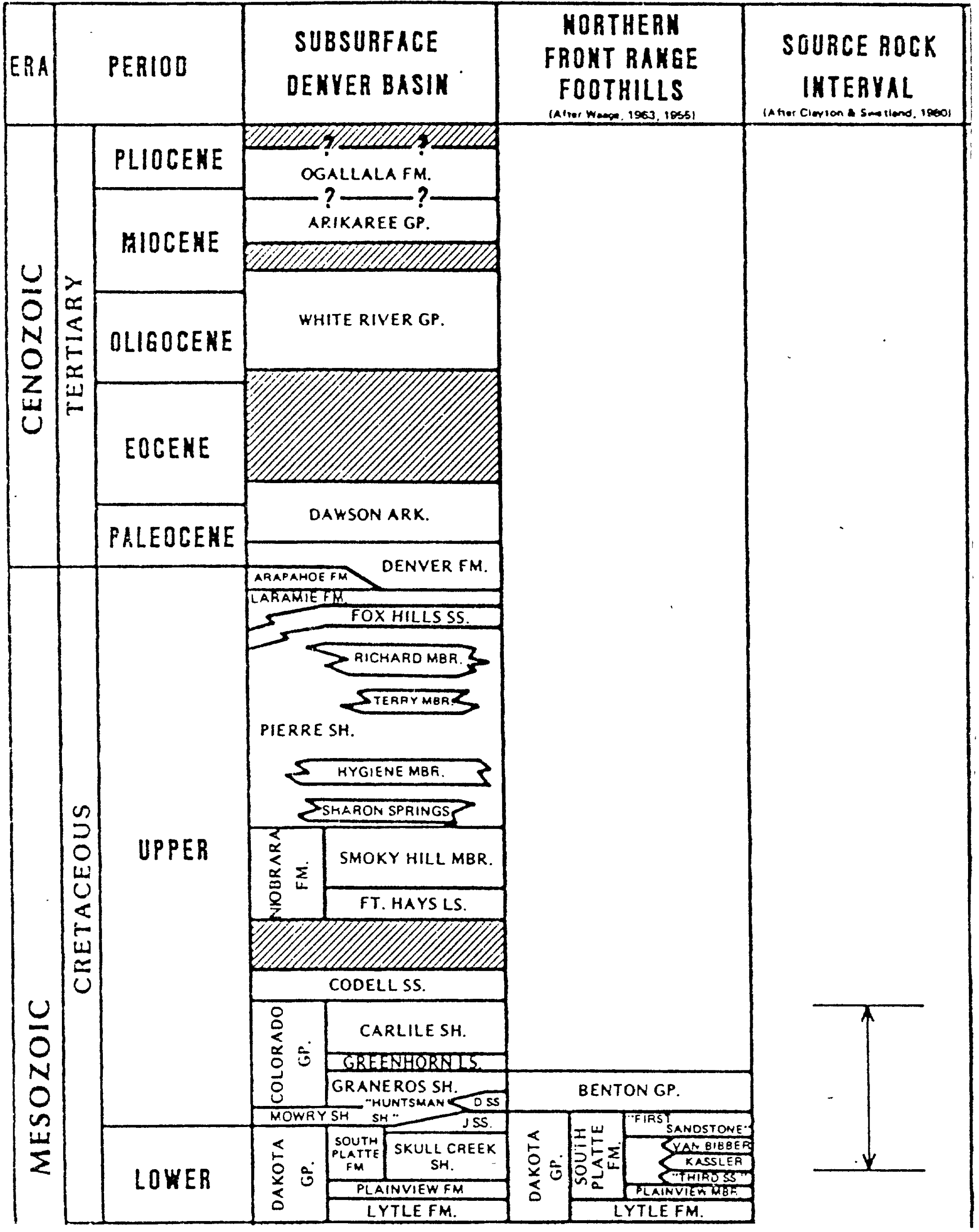
ERA
PERIOD
SUBSURFACE DENVER BASIN
NORTHERN FRONT RANGE FOOTHILLS
(After Waage, 1963, 1955)
SOURCE ROCK INTERVAL
(After Clayton & Swetland, 1980)
CENOZOIC
TERTIARY
PLIOCENE
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
?
?
OGALLALA FM.
ARIKAREE GP.
WHITE RIVER GP.
DAWSON ARK.
DENVER FM.
ARAPAHOE FM
LARAMIE FM
FOX HILLS SS.
RICHARD MBR.
TERRY MBR.
PIERRE SH.
HYGIENE MBR.
SHARON SPRINGS
MESOZOIC
CRETACEOUS
UPPER
LOWER
NIOBRARA FM.
SMOKY HILL MBR.
FT. HAYS LS.
CODELL SS.
COLORADO GP.
CARLILE SH.
GREENHORN LS.
GRANEROS SH.
"HUNTSMAN SH"
D SS
MOWRY SH
J SS.
DAKOTA GP.
SOUTH PLATTE FM
SKULL CREEK SH.
PLAINVIEW FM
LYTLE FM.
BENTON GP.
DAKOTA GP.
SOUTH PLATTE FM.
"FIRST SANDSTONE"
VAN BIBBER
KASSLER
"THIRD SS"
PLAINVIEW MBR.
LYTLE FM.

Figure 2. Generalized stratigraphic column in the Denver basin (Tainter, 1984, modified after Irwin, 1977).

VITRINITE REFLECTANCE TRENDS

Vitrinite reflectance and burial history studies by Waples (1980) and by MacMillian (1980) show a stong correlation between depth of burial and thermal maturation of organic matter. Assuming first order kinnetics, each 10 degree C increase in temperature would result in a two-fold increase in reaction rate. With increasing temperature kerogen begins to break down, resulting ultimately in the generation of oil, and then gas. Type II and III kerogen, from which Cretaceous oils in the J Sandstone are derived, begin the main phase of oil generation at approximately 0.6 R_o, with the onset of gas generation at approximately 1.35 R_o. Organic matter with R_o values below .60 are considered thermally immature for thermogenic generation of hydrocarbons. An R_o of over 1.35 is considered overmature for oil, and gas is the primary hydrocarbon generation product (Waples, 1980).

Vitrinite reflectance results were plotted on the enclosed isoreflectance map and the R_o versus sample depth graph (plate 1, fig. 3). Trends are apparent from the vitrinite reflectance contour map. R_o increases with depth in the basin, reflecting the effects of increased burial on thermal maturation. Vitrinite reflectance increases exponentially with a linear increase in depth, as indicated on the graph (figure 3). As is evident from the graph, the highest R_o values are present in the Wattenburg field area, at depths of over 7800 ft. (fig. 1). The correlation coefficent of R_o to depth is .48, however this low correlation may be due partly to the existence of two distinct sample populations. The correlation coefficient of depth to R_o for the sample population shown as triangles on the graph is .66. The higher R_o values for the Wattenburg samples is too great to be explained by either the greater burial depth of these samples, or by analytical error. Samples shown as closed circles on the graph are located in an area corresponding to the northeast projection of the Colorado Mineral Belt. These J samples range from 1.14 to 1.51 R_o at depths of 7800 to 8300 ft. (table 1,plate 1). The points are located significantly above the linear regression curve for the basin as a whole, possibly indicating the effect of a greater heat flow in this part of the basin, as compared to outlying areas. Present-day geothermal gradient maps record a higher gradient for this part of the basin with 1.8 to 2.0 degrees F/100 ft. for the Wattenburg area, as compared to 1.6 to 1.8 degrees F/100 ft. for most of the surrounding area (McKinney, et al., 1976).

The lowest R_o values are present in cores from the shallow eastern flank of the basin, indicating the effects of lower heat due to shallower burial depths. Outcrop samples also record low R_o values along most of the western boundary, indicating relatively shallow burial depths prior to uplift and exposure. The outcrop samples which are on trend with the Colorado Mineral Belt (sample no.'s 27-29) have higher R_o values than most of the surrounding outcrop samples, a possible result of the higher heat flow in this area. Outcrop samples 27 and 28 are located within a mile of each other, but have R_o values of 1.45 and 0.62, respectively. The anomalously high value of 1.45 R_o may be due to the error of the analytical method, or it may represent the actual thermal maturity of this location.

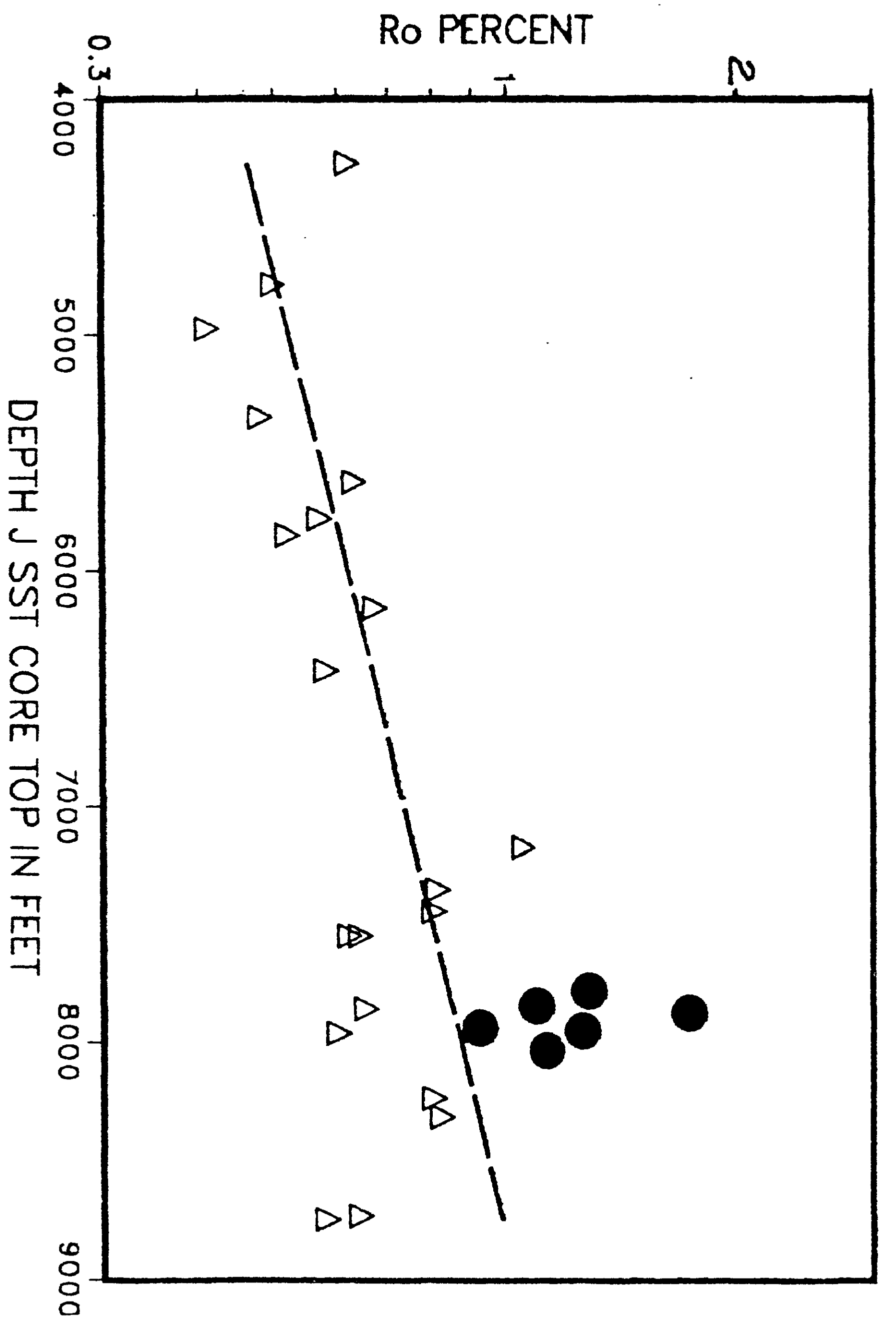

Figure 3. Linear regression of the base 10 log of vitrinite reflectance versus depth. Line of regression is dashed, samples from proposed high heat flow area are indicated by solid circles, those from surrounding areas are indicated by triangles.

Clayton and Swetland (1980), in their studies of Cretaceous oils and source rocks, concluded that hydrocarbons in the Denver basin were generated from Cretaceous source rocks. They further determined that the hydrocarbons migrated laterally towards the flanks of the basin, with migration rates of up to 100 miles or more. Assuming hydrocarbon generation from the overlying Mowry and Graneros or underlying Skull Creek shale, the oil window of .60 R_o percent is reached at a depth of approximately 6,000 ft. (figure 3). This scenario does not account for Tertiary uplift and erosion which would increase the maximum burial depth by 800 feet or more. Updip migration of hydrocarbons from the basin center is indicated by the existence of oil fields in areas with R_o values significantly below the oil window of .60 R_o.

SUMMARY

The Cretaceous J Sandstone in the Denver basin is composed of marine and deltaic sandstones and shales bounded by marine shales. Coals and carbonaceous shales from these units were sampled from 26 core holes and 14 outcrop locations for vitrinite reflectance analysis.

The contour map and depth vs R_o regression plot show that the degree of thermal maturity is closely related to depth. This correlation is based on temperature increases, with resulting increase in hydrocarbon reaction rates, that occur with greater burial depth. In the Denver basin, R_o increases exponentially with a linear increase in depth. The highest R_o values are located in the Wattenburg field area of southwestern Weld County, ranging from 1.14 to 1.51 R_o. The anomalously high R_o values exibited in the Wattenburg field area indicate the effects of a greater present-day and paleoheat flow than surrounding areas. The lowest values are present on the shallower eastern flank, and from outcrops along the western boundary.

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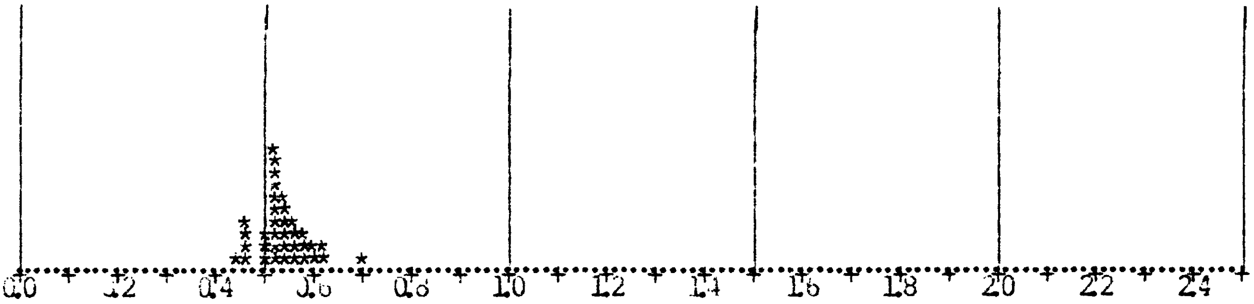
APPENDIX A

The following pages are the best copies available.

D*1-35 Doll

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.45 0.47 0.47 0.47 0.47 0.51 0.51 0.51 0.52 0.52 0.52 0.52 0.53 0.53 0.53 0.53 0.53 0.53 0.54 0.54
 0.54 0.55 0.55 0.55 0.56 0.56 0.56 0.57 0.58 0.59 0.59 0.60 0.61 0.62 0.63 0.72
Minimum     0.45          N             36          Std.Dev.      0.05
Midrange    0.59          Mean        0.54          Variance      0.00
Maximum     0.72          Median      0.54          Range         0.27
Class  .    0.02
```



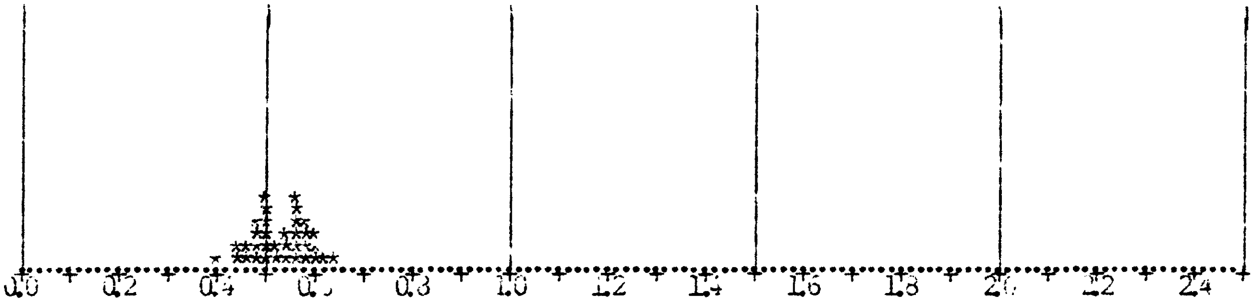
```
Pick: ..52 Alt. Prob. LJ  to  PASL/+pgn=+


U.S G.S. OP-        Project: Gautier
                Other ID      Mean depth:      0.00 meters
 ell or section: G 678     0.00 feet
Sample Type: core    ,  Prep: acid mac.
Date: 6II184  Time:   to   Analyst:    MJP
Standard used: Sa 16,  Standard change at end: .00
```

Perc $\bar{X}$=.46 .215
r = -.384

D*1-35 Doll

2/3

```
good slide.  Organics are actually bimaceralic pieces of coal.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.41 0.45 0.45 0.46 0.46 0.48 0.48 0.49 0.49 0.50 0.50 0.50 0.50 0.51 0.51 0.52 0.53 0.55 0.55 0.55
 0.56 0.56 0.56 0.57 0.57 0.57 0.58 0.58 0.58 0.58 0.60 0.60 0.61 0.62 0.64
Minimum     0.41          N              35        Std.Dev.      0.05
Midrange    0.53          Mean         0.53        Variance      0.00
Maximum     0.64          Median       0.55        Range         0.23
Class  .    0.02
```



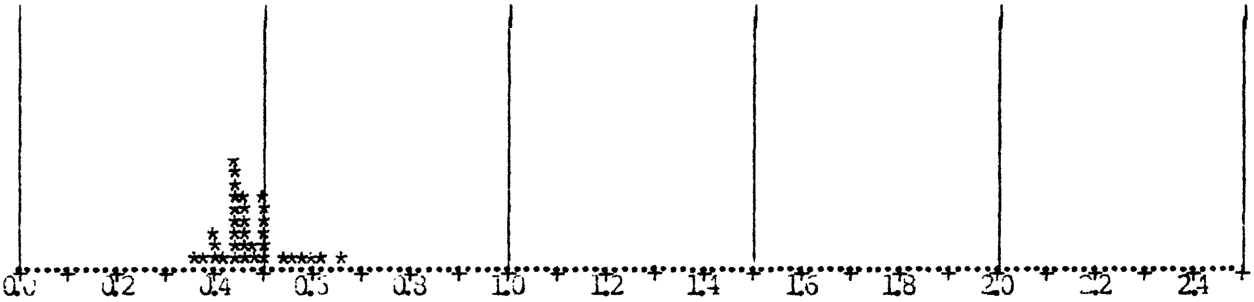
```
Pick: .52 Alt. Prob. LG  to  PAsLV+pgn=+


U.S.G.S. OP-        Project: Gau ier
               Other No. I-79  Mean depth:      0.00 meters
 Well or section:               0.00 feet
Sample type: core,  ,  Prep: acid mac.
Date  10Iv84  Time:  to  Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .[illegible]
```

3/3

D) *1-35 Doll

Good slide. Organics are uncommon but they are consistent and similar in color and structure.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.37 0.38 0.40 0.40 0.40 0.42 0.44 0.44 0.44 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.46 0.46 0.47 0.47
 0.47 0.49 0.49 0.50 0.50 0.50 0.51 0.51 0.51 0.54 0.56 0.59 0.61 0.63 0.68
Minimum     0.37          N            35          Std.Dev.     0.07
Midrange    0.53          Mean       0.48          Variance     0.00
Maximum     0.68          Median     0.46          Range        0.31
Class  .    0.02
```

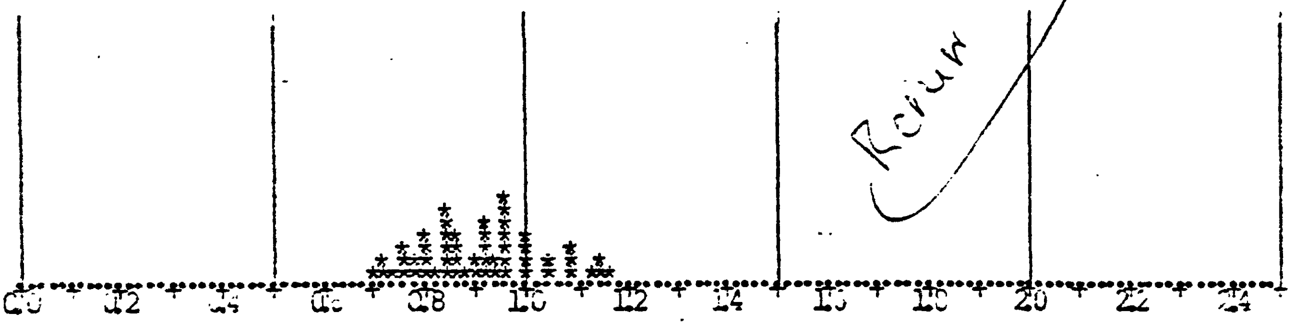


```
Pick: .46 Alt. Prob. LG  to  PA;LV+pgh=+


U.S.G.S. OP- SS        Project: Gautier
                 Other No.    Mean depth:      0.00 meters
 ell or section:      80       0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 13III84  Time:  to   Analyst:    MJP
Standard used: Sa-16,  Standard change at end: .00
```

② 50 UPRR PAN-AM B

1 of 2

```
Good slide, good polish.  Organics are v. common, but the low gray material
is much less so.  Pieces are small, monomaceralic and structureless.
The high gray material is similar in appearance and texture,and abundant.
Mineral matter is abundant, and v. fine pyrite is common.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.70 0.72 0.72 0.75 0.76 0.76 0.77 0.78 0.78 0.80 0.81 0.81 0.81 0.83 0.84 0.84 0.84 0.85 0.85 0.85
 0.87 0.87 0.87 0.87 0.88 0.90 0.90 0.92 0.92 0.93 0.93 0.93 0.94 0.95 0.96 0.96 0.96 0.97 0.97 0.97
 0.97 1.00 1.00 1.00 1.02 1.05 1.05 1.08 1.08 1.09 1.13 1.14 1.15 1.16
Minimum     0.70          N               54          Std.Dev.      0.12
Midrange    0.93          Mean          0.91          Variance      0.01
Maximum     1.16          Median        0.91          Range         0.46
Class w.    0.02
```



Return done

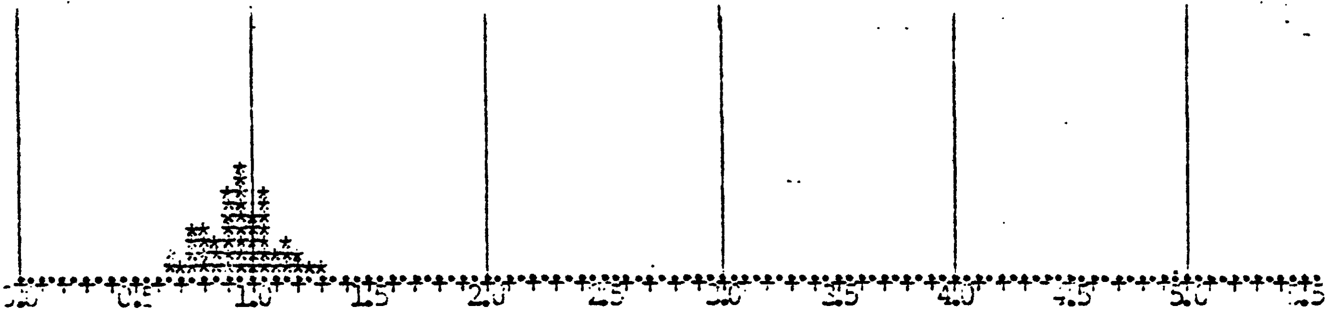
```
Pick: .91 Alt. Prob. LG  to  PASLV+pgh=53577+327


U.S.G.S. OP- 565-B        Project: D.Rice/Wattenberg
                 Other No.   Mean depth:  2421.64 meters
Well or section: Panlan "B"          7945.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 22IX81  Time: 12:35 to 1:00  Analyst:   MJP
Standard used: SA-16,  Standard change at end: .00

Data file 170    Track No.   0    Tape No.  24
OP-565-B//-.91//N54/S.D0/Med0.91/core/acid mac./22IX81/MJP/F170T24.0/PASLVpgh=53577+327//

Info file 171    Track   0    Tape  24
```

②

292

Organics are quite scarse, and the low gray material is more so. Polish is OK but, there is some surface grit which partially obscured the Ro readings. The pieces are all small, monomaceralic and structureless. No other maceral were represented in the slide. Mineral matter was v. abundant and v. fine X'line pyrtie was also abundant.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.68 0.72 0.77 0.79 0.80 0.82 0.82 0.84 0.84 0.84 0.85 0.90 0.91 0.92 0.93 0.94 0.94 0.96 0.97 0.97
 0.97 0.98 0.98 0.99 0.99 0.99 1.00 1.01 1.01 1.02 1.02 1.03 1.05 1.06 1.06 1.08 1.08 1.10 1.10 1.12
 1.12 1.12 1.14 1.17 1.20 1.22 1.22 1.24 1.24 1.31 1.33
Minimum     0.68        N               51        Std.Dev.     0.15
Midrange    1.01        Mean          1.00        Variance     0.02
Maximum     1.33        Median        0.99        Range        0.65
Class W.    0.05
```



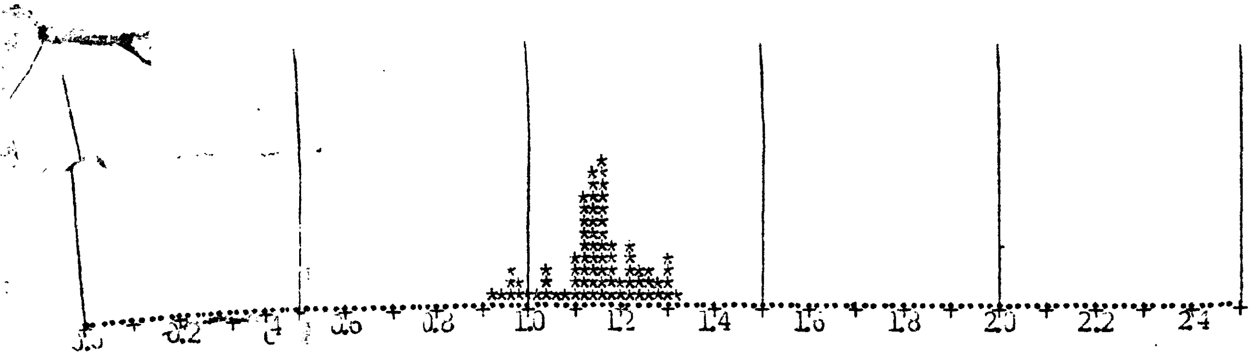
```
Pick: 1.00 Alt. Prob. LG  to  PAILV+pgh=55577+614

                    rerun of 22IX81
U.S.G.S. OF- 565-B        Project: Rice/Wattenberg
                  Other No.   Mean depth:  2421.64 meters
Well or section  50-UPRR Panlan "C"          7945.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: [illegible]  Time: 9:00 to 9:20  Analyst:  [illegible]
Standard used: SA-10,  Standard change at end: .0[illegible]

Data file 2[illegible]     Track No.    0    Tape No.  24
OF-565-B//[illegible]//[illegible]/ [illegible]/ e0.9/core/acid mac./8X1/ [illegible]/F0- 24.0/PAILVpg=5557+61-/rerun of 22IX81/

 nbo file 2.5    Track   0    Tape  24
```

15

③

GEORGE W. STEIBER – 8032' Depth
24-1N-67W
BLK SH c̄ CBN, VITREOUS LUSTER
Top of J2 SS.

```
Coal preparation.  Large monmmaceralic pieces, easy scan.

*****************| ORDERED REFLECTANCE VALUES [*****************
 0.92 0.95 0.96 0.97 0.97 0.99 0.99 1.00 1.03 1.04 1.05 1.05 1.07 1.09 1.10 1.10 1.10 1.11 1.12 1.12
 1.12 1.12 1.12 1.13 1.13 1.13 1.13 1.14 1.14 1.14 1.14 1.15 1.15 1.15 1.15 1.15 1.15 1.15 1.16 1.16
 1.16 1.16 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.18 1.18 1.19 1.19 1.19 1.20 1.21 1.22 1.22 1.22
 1.22 1.22 1.24 1.25 1.25 1.26 1.27 1.27 1.28 1.29 1.30 1.31 1.31 1.31 1.32
Minimum     0.92          N              75         Std.Dev.       0.09
Midrange    1.12          Mean         1.15         Variance       0.01
Maximum     1.32          Median       1.15         Range          0.40
Class  .    0.02
```

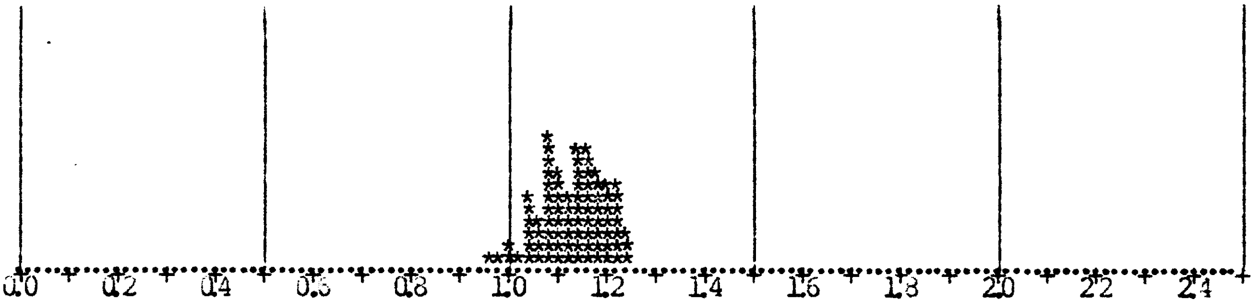


```
Pick: 1.15 Alt. Prob. LG  to  PASLV+ogn=75539+211

U.S.G.S. OP-, Project: Gautier
               Other No. CO-83-28-C1  Mean depth:  2443.15 meters
 ell or Location: G. W. Steiber        8032.00 feet
Sample Type: core,  ,  Prep: coal
Date: 18XI83  Time:  to  Analyst:  MJP
Standard used: SA-16, Standard change at end: .00
```

292

3) G. W. Steiber

```
Good slide.  Preparation is a coal.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.97 0.99 1.00 1.01 1.02 1.04 1.05 1.05 1.05 1.05 1.05 1.06 1.06 1.07 1.07 1.08 1.08 1.08 1.08 1.08
 1.08 1.08 1.08 1.09 1.09 1.09 1.10 1.10 1.10 1.10 1.11 1.11 1.11 1.11 1.12 1.12 1.12 1.12 1.12 1.13
 1.14 1.14 1.14 1.14 1.14 1.14 1.15 1.15 1.15 1.15 1.16 1.16 1.16 1.16 1.16 1.16 1.17 1.17 1.17 1.17
 1.18 1.18 1.18 1.18 1.19 1.19 1.19 1.19 1.20 1.20 1.20 1.21 1.21 1.21 1.21 1.22 1.22 1.22 1.23 1.23
 1.23 1.23 1.24 1.24 1.25
Minimum     0.97         N              85         Std.Dev.     0.06
Midrange    1.11         Mean         1.13         Variance     0.00
Maximum     1.25         Median       1.14         Range        0.28
Class  .    0.02
```



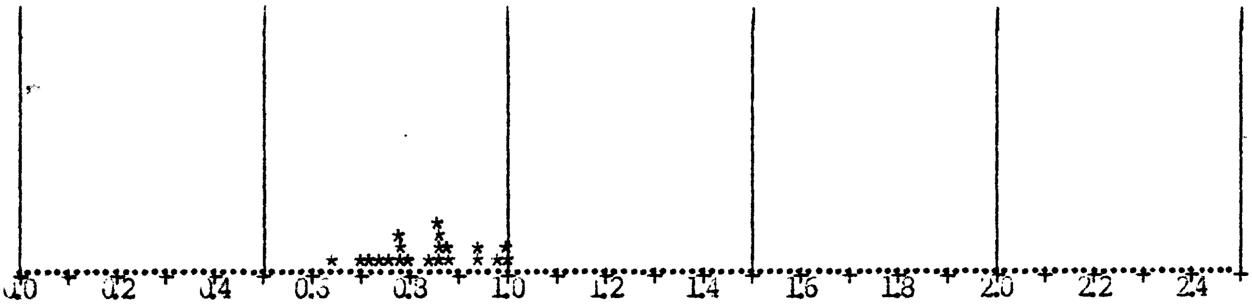
```
Pick: 1.13 Alt. Prob. LG  to  PASLV+pqh=89999+212


U.S G.S. OP- 659-K1         Project: Gautier
                 Other No. CO 83-202 C1  Mean depth:  2448.46 meters
 Well or section:           8033.00 feet
Sample Type: Core,  ,  Prep: coal
Date: 9II84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end:  00

Data file 236    Track No.   0    Tape No.  34
OP-659-K1/CO 83-202 C1/Pl.13//N85/S.00/Medl.14/Core/coal/9II84/MJP/F236T34.0/PASLVpqh=89999+212/

Info file 237    Track   0    Tape  34
```

④ [redacted] UPRR # 34
17-2N-63W

7352' Depth CBN parting in LT
GY VFSS, BIOTURB
UPPER J3 PROB, D.Front

hole rock slide made from organics scraped from a core sample. Pieces are sparse, though the Ro readings were taken on good bi and trimaceralic pieces of **coaal.** Abundant higher Ro material, probably recycled organics.
1

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.65 0.70 0.72 0.75 0.76 0.78 0.78 0.79 0.81 0.84 0.86 0.86 0.86 0.86 0.88 0.89 0.95 0.95 0.99 1.01
 1.01
Minimum     0.65          N             21          Std.Dev.      0.10
Midrange    0.83          Mean        0.84          Variance      0.01
Maximum     1.01          Median      0.86          Range         0.36
Class   .   0.02
```



Pick: .85±Alt:.80 Prob: LGPAtoV BABEV+pgh=++

U.S.G.S. OF- 659-C   Project: Gautier
Other No. CO-83-36-C1   Mean depth: 2240.89 meters
Well or Section: ~~J. . Steiber~~   7352.00 feet
Sample Type: core, , Prep: whole rock
Date: 18XI83 Time: to Analyst: MJP
Standard used: SA-18, Standard change at end: .00

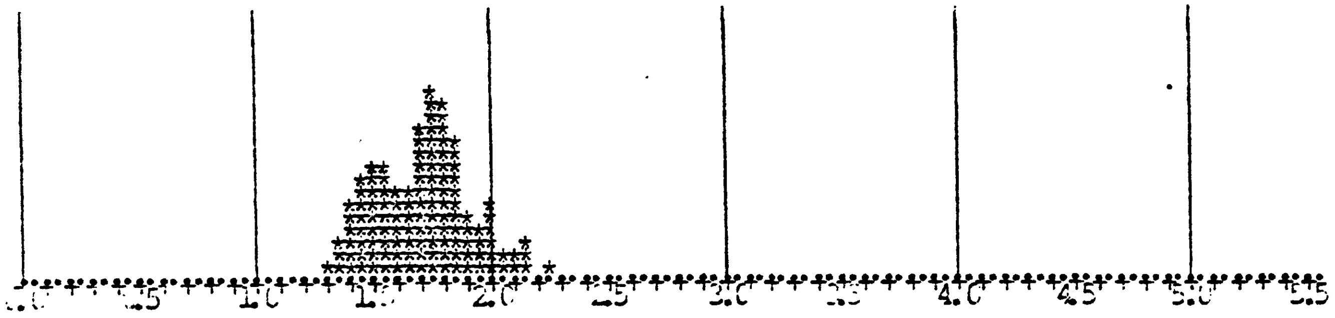
1.92

⑤ *1 Osman

Pick 1,51 Ro

Good polish. Organics are abundant and so is the choice of the low gray. Pieces are small to large, almost entirely monomaceralic and have a large amount of pyrite both in the vitrinite and dispersed. There is a wide range of material as for th e Ro, The mean value should probably be a bit lower.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 1.30 1.35 1.35 1.39 1.41 1.41 1.42 1.43 1.43 1.44 1.45 1.45 1.46 1.47 1.47 1.48 1.49 1.49 1.50 1.50
 1.50 1.51 1.52 1.52 1.54 1.54 1.54 1.55 1.55 1.56 1.57 1.57 1.58 1.58 1.58 1.59 1.60 1.60 1.61 1.62
 1.62 1.63 1.64 1.65 1.65 1.67 1.67 1.67 1.68 1.68 1.70 1.70 1.70 1.70 1.70 1.71 1.72 1.72 1.72 1.72
 1.72 1.73 1.75 1.75 1.75 1.75 1.75 1.75 1.76 1.76 1.76 1.78 1.78 1.79 1.79 1.79 1.79 1.80 1.80 1.80
 1.80 1.81 1.81 1.81 1.82 1.82 1.82 1.83 1.83 1.84 1.84 1.86 1.86 1.86 1.87 1.88 1.88 1.88 1.89 1.89
 1.89 1.89 1.91 1.91 1.92 1.92 1.94 1.96 1.98 1.99 1.99 2.00 2.00 2.00 2.02 2.03 2.03 2.05 2.07 2.12
 2.12 2.15 2.16 2.16 2.27
Minimum     1.30         N           125         Std.Dev.     0.20
Midrange    1.79         Mean       1.73         Variance     0.04
Maximum     2.27         Median     1.75         Range        0.97
Class W.    0.05
```



```
Pick: 1.75 Alt.1.625 Prob. LG  to  PASLV+pgh=76679+426


U.S.G.S. OF- 565-C       Project: D.Rice  attenberg
                   Other No. D-133  Mean depth:  2398.17 meters
Well or section: Amoco 1-Osman           7868.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 21IX81  Time: 11:00 to 11:15  Analyst:   MJP
Standard used: SA-16,  Standard change at end: .00

Data file 158     Track No.   0     Tape No.  24
OF-565-C/D-133/P1.75/1.625/N125/S.00/Med1.75/core/acid mac./21IX81/MJP/F158T24.0/PASLVpgh=76679+426//

 Rho file 159     Track   0     Tape  24
```

5) #1 Osman 2 of 2

55

1.35

1.35

1.35

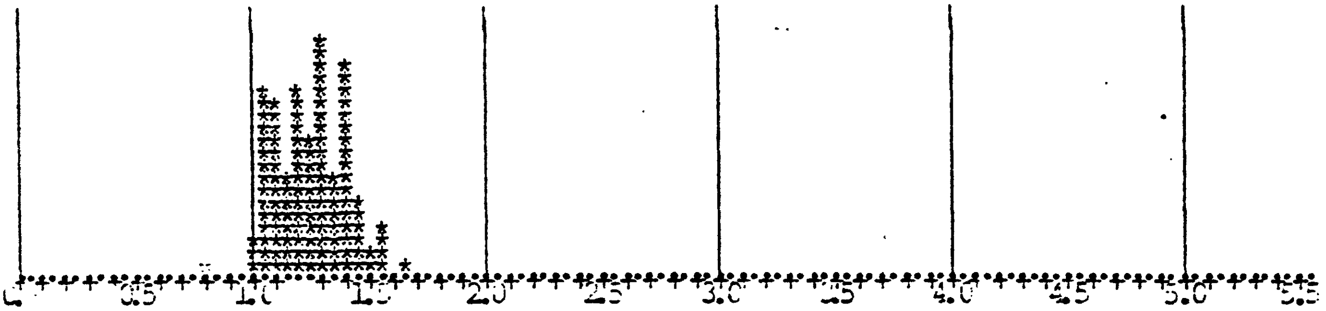
26-8 00-85-7

191

⑥ *1 DUTCHER UNIT

Good polish, organics are abundant. Mmaterial is small to large pieces, and about entirely monomaceralic. Pyrite is common, mostly as v. small pieces & dispersed and some as inclusions in the vitrinite. The low gray is quite abundant and makes for an easy scan.

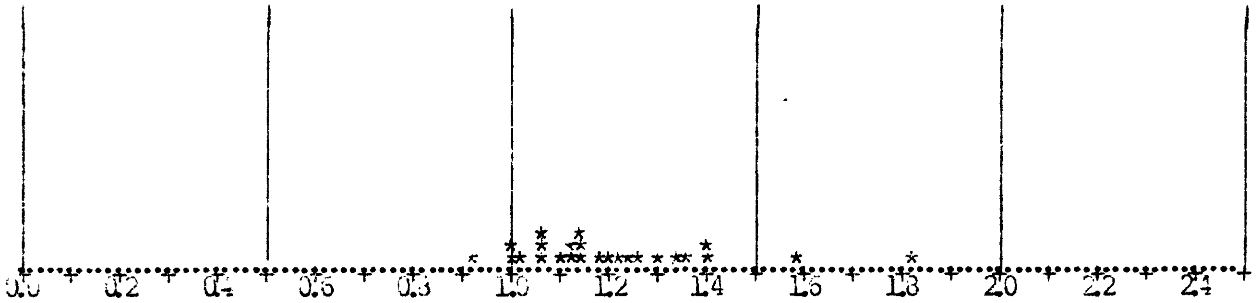
```
******************] ORDERED REFLECTANCE VALUES [*****************
 0.80 1.00 1.01 1.04 1.04 1.05 1.06 1.06 1.07 1.07 1.07 1.07 1.07 1.08 1.08 1.08 1.08 1.08 1.08 1.09
 1.10 1.10 1.11 1.11 1.11 1.11 1.12 1.13 1.13 1.13 1.13 1.14 1.14 1.14 1.15 1.15 1.16 1.18 1.18 1.18
 1.18 1.19 1.20 1.21 1.21 1.21 1.22 1.22 1.22 1.23 1.23 1.23 1.23 1.24 1.24 1.24 1.24 1.25 1.26 1.27
 1.27 1.28 1.28 1.29 1.29 1.29 1.29 1.29 1.30 1.30 1.30 1.31 1.31 1.31 1.32 1.32 1.32 1.32 1.32 1.33
 1.33 1.33 1.33 1.33 1.34 1.34 1.34 1.35 1.36 1.36 1.37 1.38 1.38 1.39 1.39 1.40 1.40 1.40 1.40 1.41
 1.42 1.42 1.42 1.42 1.43 1.43 1.43 1.43 1.44 1.44 1.44 1.44 1.47 1.47 1.47 1.49 1.49 1.49 1.53 1.54
 1.56 1.56 1.57 1.58 1.66
Minimum     0.80           N            125          Std.Dev.     0.15
Midrange    1.23           Mean        1.27          Variance     0.02
 Maximum    1.66           Median      1.28          Range        0.86
Class W.    0.05
```



```
Pick: 1.25 Alt.1.30 Prob. LG  to  PASLV+pgh=76679+526

U.S.G.S. OP- 565-D        Project: D.Rice Wattenberg
                 Other No. A-845   Mean depth:  2429.56 meters
Well or section: Amoco 1 Dutcher Union          7971.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 21Dec81  Time: 11:40 to 11:50  Analyst:   JP
Standard used: SR-16,  Standard change at end: .00

Data file 150    Track No.   0    Tape No.  24
D-565-D/A-845/P1.25/1.30/N125/ .0 /Md1.28/core/acid mac./21DE81/ JP/F150T24.0/PASLVpgh=76679+526//

Info file 161    Track   0    Tape  24
```

8) E. Marz Serafini

```
This slide is similar to others in that it contains unusual material, quite
similarr to bitumin.  The vitrinite though was significantly higher in Ro and
much easier to select.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.92 1.00 1.00 1.03 1.06 1.07 1.07 1.11 1.12 1.13 1.14 1.15 1.15 1.19 1.21 1.23 1.24 1.26 1.30 1.35
 1.37 1.40 1.40 1.58 1.83
 Minimum     0.92          N            25          Std.Dev.      0.19
 Midrange    1.38          Mean       1.21          Variance      0.04
 Maximum     1.83          Median     1.15          Range         0.91
 Class  .    0.02
```



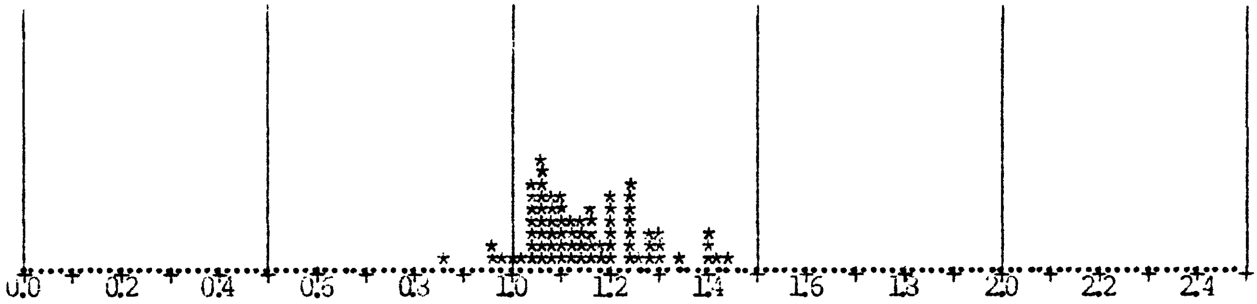
```
Pick: 1.15 Alt. Prob. LG  to  PA56V+pgh=+


U.S.G.S. OF-        Project: Gautier
                Other No. Y-158  Mean depth:     0.00 meters
 ell or section:              0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 10IV84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

7) E. Max Serafini

2 of 3

Coal. Very high inertinite content also a bit of pseudovitrinite and semi fusinite. Quite nice!

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.87 0.96 0.97 0.99 1.00 1.03 1.04 1.04 1.05 1.05 1.05 1.05 1.05 1.06 1.06 1.06 1.06 1.07 1.07 1.07
 1.07 1.07 1.08 1.08 1.08 1.08 1.08 1.09 1.10 1.10 1.10 1.10 1.11 1.11 1.12 1.13 1.13 1.13 1.14 1.14
 1.15 1.15 1.16 1.16 1.16 1.15 1.17 1.18 1.19 1.20 1.20 1.21 1.21 1.21 1.21 1.24 1.24 1.25 1.25 1.25
 1.25 1.25 1.26 1.28 1.29 1.29 1.30 1.30 1.31 1.34 1.40 1.41 1.41 1.42 1.44
Minimum      0.87          N               75          Std.Dev.      0.12
Midrange     1.16          Mean          1.15          Variance      0.01
Maximum      1.44          Median        1.13          Range         0.57
Class  .     0.02
```



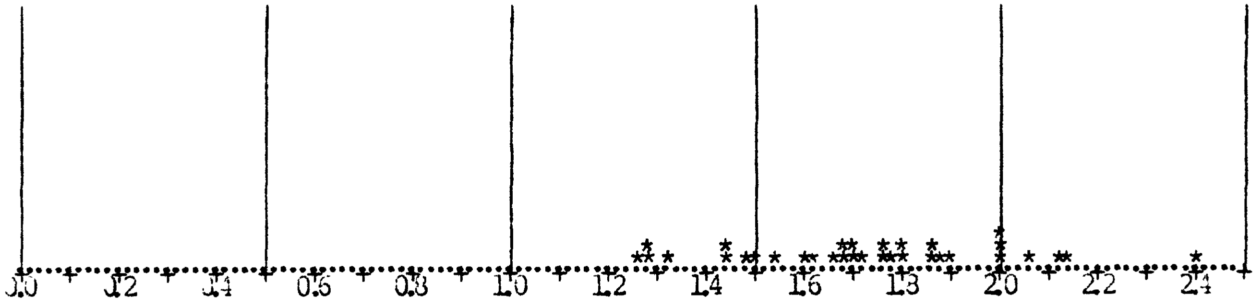
```
Pick: 1.05 Alt. Prob. L3  to  PA
```

```
U.S.G.S. OP-         Project: Gautier
                 Other No.    Mean depth:  2404.57 meters
 Well or section:(0 85 176-(7889.00 feet
Sample Type: core,  ,  Prep: coal
Date: 7III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

7) E. max Serajini 3/3

[illegible]

```
Coal.  this was mot a good sample.  Mostky pseudovitrinite and inertinite.

*****************] ORDERED REFLECTANCE VALUES [*****************
 1.26 1.28 1.28 1.33 1.45 1.45 1.48 1.50 1.54 1.60 1.63 1.66 1.68 1.69 1.70 1.71 1.73 1.77 1.77 1.79
 1.80 1.81 1.86 1.86 1.88 1.91 2.00 2.00 2.01 2.07 2.13 2.15 2.42
Minimum     1.26         N             33         Std.Dev.     0.27
Midrange    1.84         Mean        1.73         Variance     0.07
Maximum     2.42         Median      1.73         Range        1.16
Class  .    0.02
```



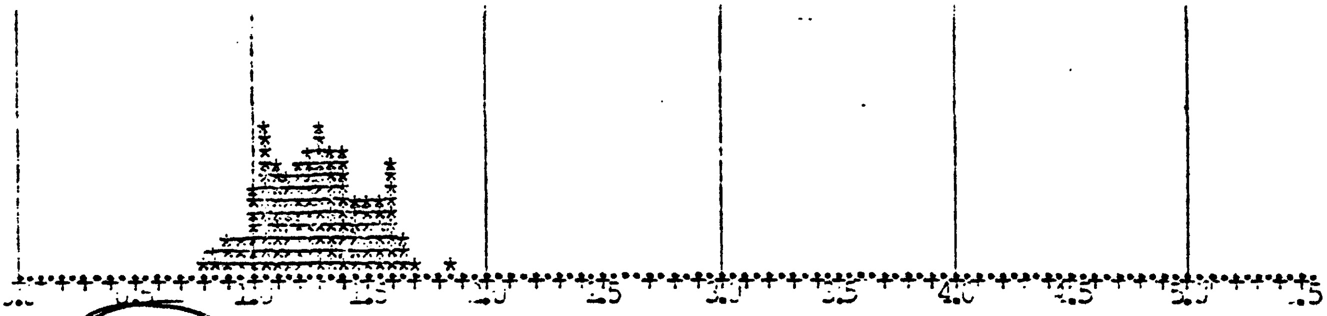
```
Pick: 1.3 Alt. Prob. LG  to  PASLv+pgh=+


U.S.G.S. OP-        Project: Gautier
                Other No.    Mean depth:      0.00 meters
 Well or section:  172      0.00 feet
Sample Type: core,  ,  Prep: coal
Date: 12III84  Time:  to   Analyst:    MJP
Standard used: Sa-16,  Standard change at end: .00
```

⑨ *1 matushima 1 of 2

1.31 Ro

Good polsin. Organics are v. abundant and the pick was relatively easy. Pieces are small to large, almost entirely monomacerallic, but with fusinite as a fairly common individual maceral addition. There is v. abundant mineral matter, mostly pyrite which occurs as single X'ls in the vitrinite and as tiny X'ls dispresed throughout the slide.

```
******************] ORDERED REFLECTANCE VALUES [*****************
 0.83 0.86 0.90 0.91 0.95 0.96 0.96 0.99 1.01 1.01 1.04 1.04 1.04 1.05 1.06 1.06 1.06 1.07 1.08 1.08
 1.08 1.08 1.09 1.09 1.09 1.11 1.11 1.11 1.11 1.12 1.12 1.12 1.14 1.14 1.14 1.15 1.15 1.16 1.17 1.17
 1.17 1.19 1.20 1.20 1.20 1.21 1.22 1.22 1.22 1.23 1.23 1.25 1.25 1.26 1.26 1.28 1.28 1.29 1.29 1.29
 1.30 1.30 1.30 1.31 1.31 1.32 1.32 1.33 1.33 1.33 1.34 1.34 1.34 1.35 1.35 1.35 1.35 1.37 1.37 1.39
 1.39 1.39 1.39 1.39 1.40 1.40 1.41 1.42 1.42 1.42 1.42 1.42 1.43 1.44 1.44 1.45 1.45 1.48 1.49 1.49
 1.49 1.50 1.51 1.52 1.52 1.53 1.55 1.56 1.58 1.58 1.58 1.58 1.59 1.59 1.61 1.62 1.62 1.62 1.62 1.64
 1.64 1.65 1.65 1.66 1.67 1.68 1.68 1.72 1.91
  Minimum      0.83           N          129          Std.Dev.      0.22
  Midrange     1.37          Mean        1.31         Variance      0.05
  Maximum      1.91          Median      1.31         Range         1.08
 Class W.      0.05
```



```
Pick: 1.31 Alt. Proc. LG  to  PASLv+pgn=77679+636

U.S.G.S. OF- 585-H        Project: D.Rice  Pattenberg
                 Other No. A-757  Mean depth:  237[illegible].96 meters
Well or section: Amoco 1-Matashima          [illegible]505.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 21IX81  Time: 9:30 to 9:45  Analyst:   JP
Standard used: SA-10,  Standard change at end: .00

Data file 1.4    Track No.   0    Tape No.  24
OF-585-H/A-757/[illegible]/Well.1 cor./acid mac./21IX.1[illegible]/F15412[illegible].0/PASLv+pgn-77679+636/

This file 1.5    Track  0    Tape  24
```

1.31 25

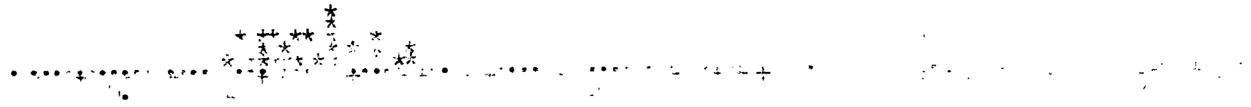
⑧ ※1 MATUSHIMA

2 of 2

1.31 R_0

1.31

1.23

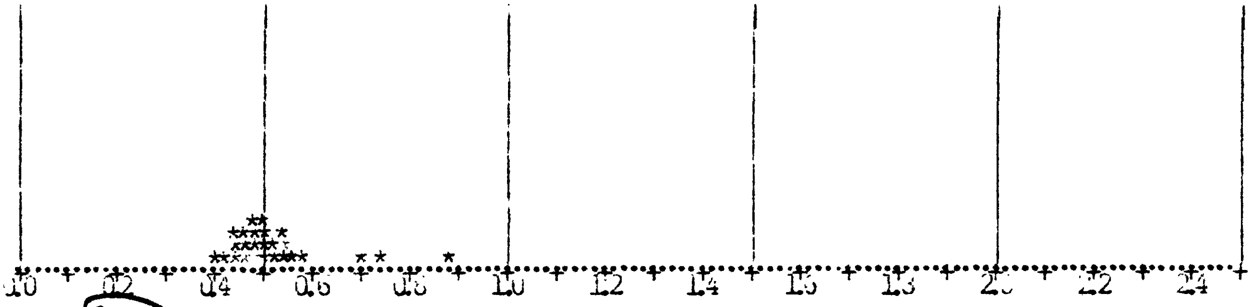


1.30

26-7//CD-85-4

⑨ HANSEN NE NE 24, T5N-R49W 1 of 1
4068.9' J ss - gy sh.

```
Good slide.  Large pieces of bimaceralic coal.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.41 0.43 0.44 0.45 0.45 0.46 0.46 0.47 0.48 0.48 0.49 0.49 0.50 0.50 0.51 0.51 0.52 0.52 0.54 0.54
 0.55 0.57 0.58 0.71 0.74 0.90
Minimum      0.41         N              26         Std.Dev.     0.10
Midrange     0.66         Mean         0.53         Variance     0.01
Maximum      0.90         Median       0.50         Range        0.49
Class I.     0.02
```



```
Pick  .49 Alt. Prob. .03  .0  P  SDV+Sgn=+

U.S.G.S. OP-          Project: Gautier
              Other No. R-127  Meas. depth:      0.00 meters
 Well or section:             0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 10I 84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

23

27

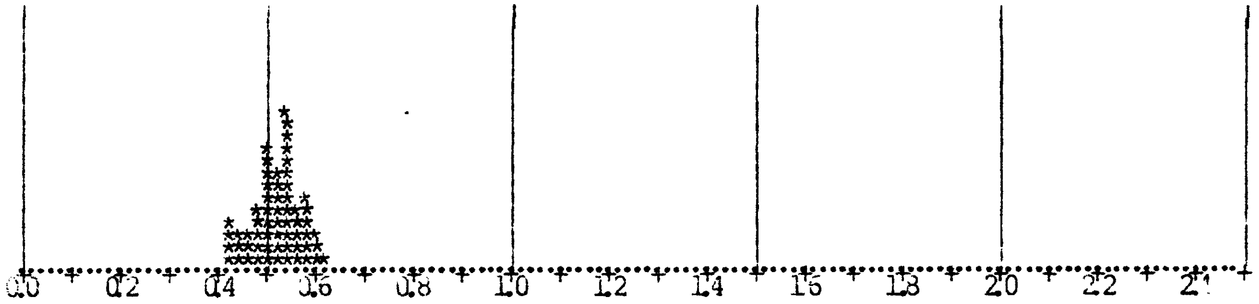
53-55 $\bar{X}$ = .56.6

s = 0.095

1 of 3

10 *1 fagg

```
goodslide.

****************] ORDERED REFLECTANCE VALUES [****************
 0.42 0.42 0.42 0.43 0.44 0.45 0.45 0.46 0.46 0.47 0.48 0.49 0.49 0.49 0.49 0.50 0.50 0.50 0.50 0.50
 0.50 0.50 0.51 0.51 0.51 0.52 0.52 0.52 0.53 0.53 0.53 0.53 0.53 0.54 0.54 0.54 0.54 0.54 0.54 0.55
 0.55 0.55 0.55 0.55 0.55 0.55 0.56 0.56 0.56 0.57 0.57 0.58 0.58 0.58 0.58 0.59 0.59 0.60 0.61 0.61
 0.62
Minimum     0.42          N              61        Std.Dev.     0.05
Midrange    0.52          Mean         0.52        Variance     0.00
Maximum     0.62          Median       0.53        Range        0.20
Class   .   0.02
```

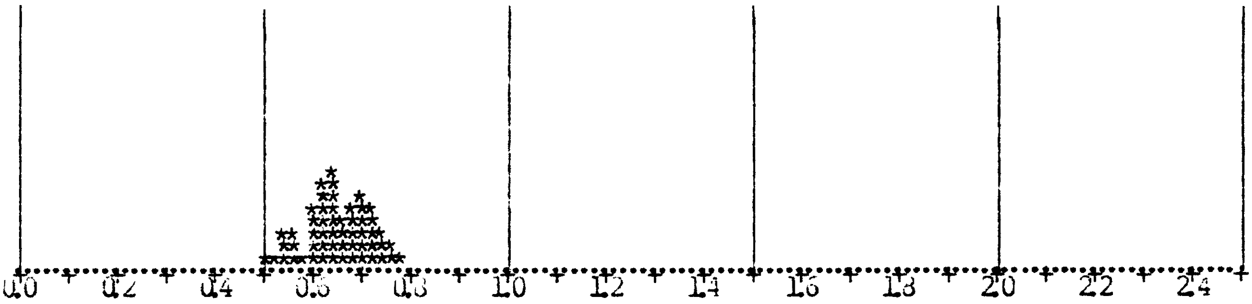


```
Pick: .52 Alt. Prob. LG  to  PA[illegible]gh=+


U.S.G.S. OP-          Project: Gautier
                   Other No.    Mean depth:       0.00 meters
 Well or section: DD-53    0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 9III84  Time:  to   Analyst:   MJP
Standard used: Sa-15,  Standard change at end: .00
```

⑩

2 of 3

```
Good sample.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.51 0.53 0.54 0.55 0.55 0.56 0.56 0.57 0.58 0.60 0.60 0.60 0.60 0.61 0.62 0.62 0.63 0.63 0.63 0.63
 0.63 0.64 0.64 0.64 0.64 0.64 0.65 0.65 0.65 0.66 0.66 0.66 0.67 0.68 0.68 0.68 0.69 0.69 0.70 0.70
 0.70 0.70 0.71 0.71 0.72 0.73 0.73 0.73 0.73 0.75 0.75 0.75 0.76 0.77 0.79
Minimum     0.51          N             55         Std.Dev.      0.07
Midrange    0.65          Mean        0.65         Variance      0.00
Maximum     0.79          Median      0.65         Range         0.28
Class   .   0.02
```

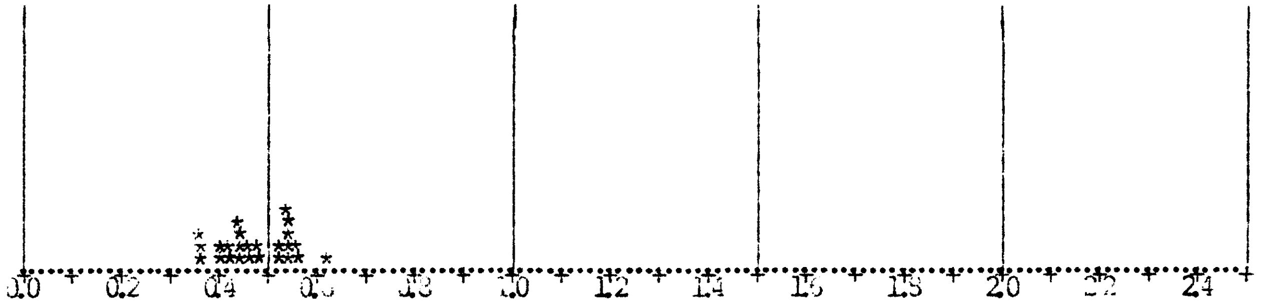


```
Pick: .64 Alt. Prob. LG  to  PASLV+pgn=+


U.S.G.S. OP-          Project: Gautier
                 Other No.    Mean depth:      0.00 meters
 Well or section:  EE 54   0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 7III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .000
```

10

3 of 3

```
******************] ORDERED REFLECTANCE VALUES [*****************
 0.36 0.37 0.37 0.41 0.41 0.43 0.43 0.44 0.44 0.44 0.45 0.47 0.47 0.49 0.49 0.52 0.53 0.54 0.54 0.55
 0.55 0.55 0.56 0.56 0.64
Minimum      0.36          N               25          Std.Dev.      0.07
Midrange     0.50          Mean          0.48          Variance      0.00
Maximum      0.64          Median        0.47          Range         0.28
Class  .     0.02
```



```
Pick: .45 Alt. Prob. LG  to  PA3LV+ogn=+

U.S.G.S. OP-        Project: Gautier
               Other No.   Mean depth:      0.00 meters
 Well or section:  F55    0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 8II184  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

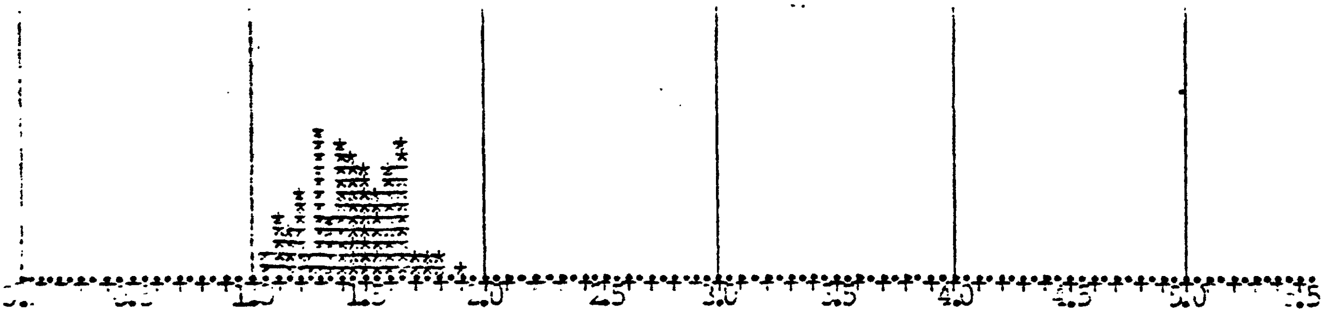
⑪ 36 UPRR #1

141

1.45 pick

Good slide, good polish. Organics are abunant and the selection of the low gray was easy. Pieces are all relatively highRo, so some editing was necessary. There is no structure in any of the material, everything is monomaceralic. Mineral matter and assorted clays and undifferentiated material is abundant.

```
******************] ORDERED REFLECTANCE VALUES [*****************
 1.07 1.08 1.11 1.12 1.12 1.14 1.15 1.15 1.15 1.19 1.19 1.22 1.23 1.23 1.23 1.23 1.24 1.24 1.28 1.29
 1.31 1.31 1.31 1.31 1.31 1.32 1.32 1.33 1.34 1.34 1.35 1.35 1.36 1.36 1.36 1.39 1.39 1.41 1.42 1.43
 1.43 1.43 1.43 1.44 1.45 1.45 1.45 1.45 1.45 1.47 1.48 1.48 1.49 1.49 1.49 1.49 1.50 1.50 1.51 1.51
 1.52 1.52 1.52 1.54 1.54 1.55 1.55 1.56 1.56 1.58 1.58 1.58 1.58 1.58 1.61 1.61 1.62 1.62 1.63 1.63
 1.64 1.65 1.65 1.65 1.65 1.66 1.66 1.67 1.67 1.67 1.67 1.69 1.70 1.70 1.72 1.73 1.76 1.80 1.81 1.83
 1.97
Minimum     1.07        N             101        Std.Dev.     0.19
Midrange    1.52        Mean         1.46        Variance     0.04
Maximum     1.97        Median       1.43        Range        0.90
Class W.    0.05
```



```
Pick: 1.45 Alt. Prob. IG  to  PASL\+pgm=76578+525
```

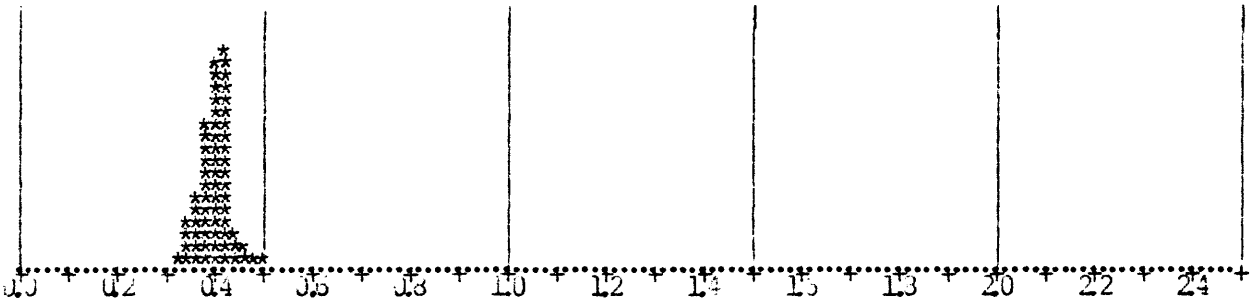
Par Am 36-UPRR No.1

```
U.S.G.S. OF- 568-1       Project: Pice/Wattenberg
               Tuner No. A-56  Mean depth:  2185.42 meters
Well or section: ~~[illegible]~~              7170.00 feet
Sample Type: core, ,  Prep: acid mac.
Date: 25IX81  Time: 11:55 to 12:10  Analyst:  MJP
Standard used: SA-16,  Standard change at end: .0

Data File 105    Track No.   0    Tape No.  24
[illegible]/?1.45/101/?.?/Med1.43/core/acid mac./25IX81/MJP/File124.0/PASLVpgm=76578+525//

Data File 137    Track   0    Tape  24
```

⑫ *1 f Segelke

1/3

```
Good slide.  Vitrinite is common, structured and in large pieces.  Appears to
been invaded by some material   The color is quite unusual for the Ro rank.,

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.33 0.34 0.35 0.35 0.35 0.36 0.37 0.37 0.37 0.37 0.37 0.38 0.38 0.38 0.38 0.38 0.39 0.39 0.39 0.39
 0.39 0.39 0.39 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.41 0.41 0.41 0.41 0.41 0.41 0.41 0.41
 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.43 0.43 0.43 0.43 0.43 0.44 0.44
 0.45 0.45 0.47 0.49 0.52
Minimum     0.33          N              65         Std.Dev.     0.03
Midrange    0.43          Mean         0.40         Variance     0.00
Maximum     0.52          Median       0.41         Range        0.19
Class  .    0.02
```

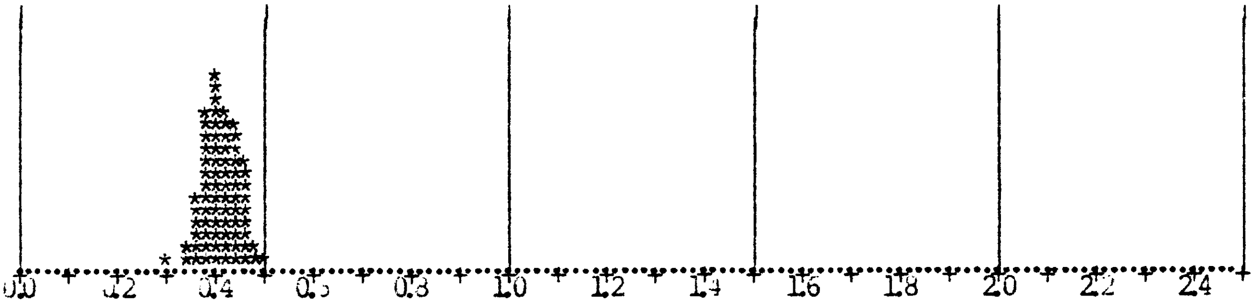


```
Pick· .40 Alt. Prob. L3  to  PASL/+ogn=+


U.S.G.S. OP-         Project: Gautier
                  Other No.   Mean depth:      0.00 meters
 Well or section:  Aa-45  0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 9III84  Time:  to   Analyst:   MJP
Standard used: Ga-16,  Standard change at end: .00
```

⑫ *1 f. Segelke

2 of 3

```
great slide.  Lots of good little vitrinites for reading.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.30 0.35 0.35 0.36 0.37 0.37 0.37 0.37 0.37 0.38 0.38 0.38 0.38 0.38 0.38 0.39 0.39 0.39 0.39 0.39
 0.39 0.39 0.40 0.40 0.40 0.40 0.40 0.40 0.41 0.41 0.41 0.41 0.41 0.41 0.41 0.41 0.41 0.41 0.42 0.42
 0.42 0.42 0.42 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.44 0.44 0.44 0.44 0.44 0.44 0.44 0.44 0.44
 0.44 0.45 0.45 0.46 0.46 0.46 0.46 0.46 0.46 0.47 0.47 0.47 0.48 0.49 0.50
Minimum      0.30            N             75           Std.Dev.      0.04
Midrange     0.40            Mean        0.42           Variance      0.00
Maximum      0.50            Median      0.41           Range         0.20
Class I.     0.02
```

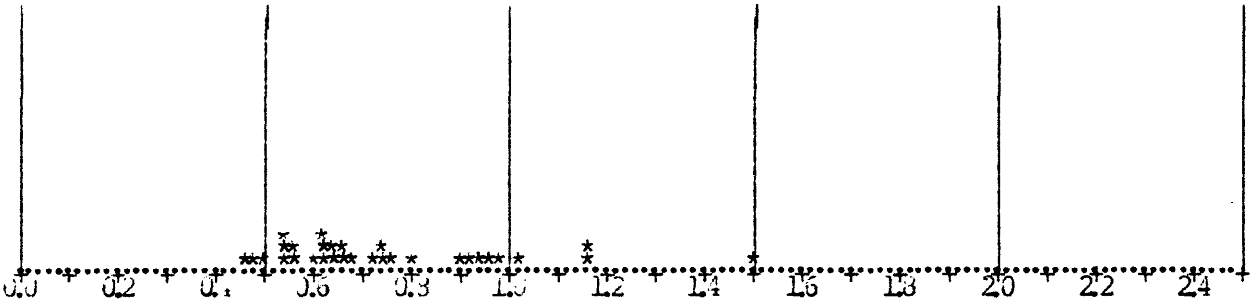


```
Pick: .41 Alt. Prop. LG  to  PASLV+pgh=+

U.S.G.S. OP-        Project: Gautier
                 Other No.   Mean depth:      0.00 meters
Well or section:   BB 46   0.00 feet
Sample Type: core,   ,   Prep: acid mac.
Date: 7III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

⑫ *1 F. Segelke

3-13

```
                                                    Rather poor slide.  Organics are un
the representative material.

Rather poor slide  Organics are uncommon and there was no consensus on the rep-
resentative material.  Since this a core sample the low Ro material
is the better  material.

******************] ORDERED REFLECTANCE VALUES [*****************
 0.47 0.48 0.50 0.54 0.55 0.55 0.56 0.57 0.61 0.62 0.62 0.63 0.65 0.65 0.66 0.66 0.69 0.73 0.75 0.75
 0.77 0.81 0.91 0.93 0.95 0.96 0.99 1.03 1.16 1.17 1.52
Minimum      0.47          N              31          Std.Dev.      0.23
Midrange     1.00          Mean         0.76          Variance      0.05
Maximum      1.52          Median       0.66          Range         1.05
Class  .     0.02
```

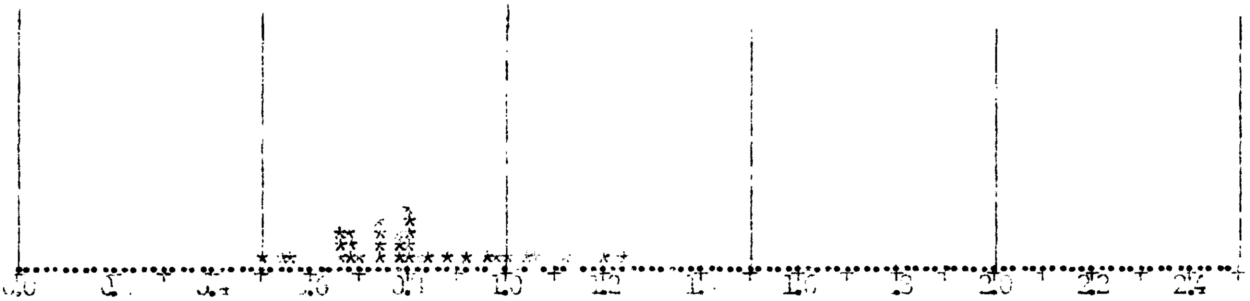


```
Pick: .55 Alt..62 Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-          Project: Gautier
                 Other No.  Mean depth:      0.00 meters
 Well or section:   Cc 49 (47) 0.00 feet
Sample Type: core,   ,  Prep: acid amc.
Date: 3III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .0
```

13 R.A. Reid

(NO *15)

```
*****************] ORDERED REFLECTANCE VALUES [***************** *
 0.51 0.55 0.57 0.62 0.65 0.65 0.68 0.68 0.69 0.71 0.74 0.74 0.74 0.75 0.78 0.79 0.79 0.80 0.80 0.81
 0.81 0.81 0.82 0.84 0.85 0.85 0.86 0.86 0.88 1.00 1.04 1.05 1.06 1.13 1.21 1.22 1.25
Minimum      0.51                    37          Std.Dev.     0.18
Interrange   0.16         Mean       0.84        Variance     0.03
Maximum      1.25         Median     0.80        Range        0.74
Class Int.   .02
```



```
 ROCK .00 Alt. Prob. 00 to PABL/-ngn=+

U.S.G.S. OF-          Project: Gaaucier
                 Sample No. 11-22**CO-84-16   Mean depth     0.00 meters
 Drill or section:               0.00 Feet
Sample type: O C,  ,    Prep: acid mac.
Date: 12/85  Time:  00  Analyst:   JP
 Standard used: a-1 , Standard change at end:
```

Well *29 (13) R.A. Reid *1
S 13 T 6N R68W
7440'

.80

35

(14) CHAMPLIN 343 Amoco 'A' #1 7855.3' Depth
15-8N-64W Laminated BLK SH-
Oxbow, lac.

(No #40)

Sample Loc. @ Top of J_2
Channel Sequence.

Good slide, in that there is some excellent bimaceralic pieces of coal in there. but the polish on the coal is unusual. It did not polish properly for the secon d time. It has a fuzzy texture which obscuress the surface and makes Ro readings impossible. A guess as to the proper Ro level would be about .5 to .60

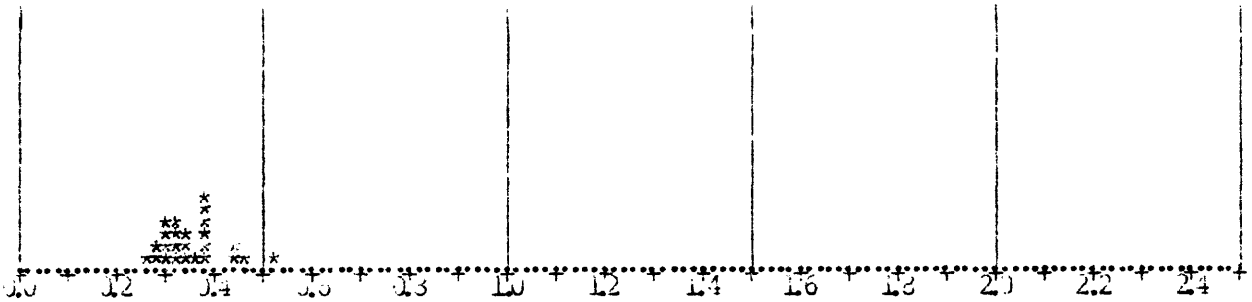
U.S.G.S. OP- 659-E/m7118 Project: Gautier
Other No. CO-83-44-C1 Mean depth: 2394.20 meters
ell or section: 7855.00 feet
Sample Type: core, , Prep: wnl. rk.
Date: 6XII83 Time: to Analyst: MJP
Standard used: , Standard change at end: .00

1of2

14) Champlin 343 Amoco A#1

A difficult slide to call. There is abundant low Ro materail,but the polish on thiis material is poor, similar to one other slide which did not polish at all. The pieces look very much like vitrinite, but more probably they are bitumins. I believe that the real vitrinite is at the .45 to .55 Ro level.

```
*****************| ORDERED REFLECTANCE VALUES [*****************
 0.27 0.28 0.28 0.30 0.31 0.31 0.31 0.32 0.32 0.32 0.33 0.34 0.34 0.35 0.36 0.38 0.38 0.39 0.39 0.39
 0.39 0.44 0.45 0.46 0.54
 Minimum      0.27            N              25          Std.Dev.      0.06
Midrange      0.41            Mean         0.36          Variance      0.00
Maximum       0.54            Median       0.34          Range         0.27
Class  .      0.02
```

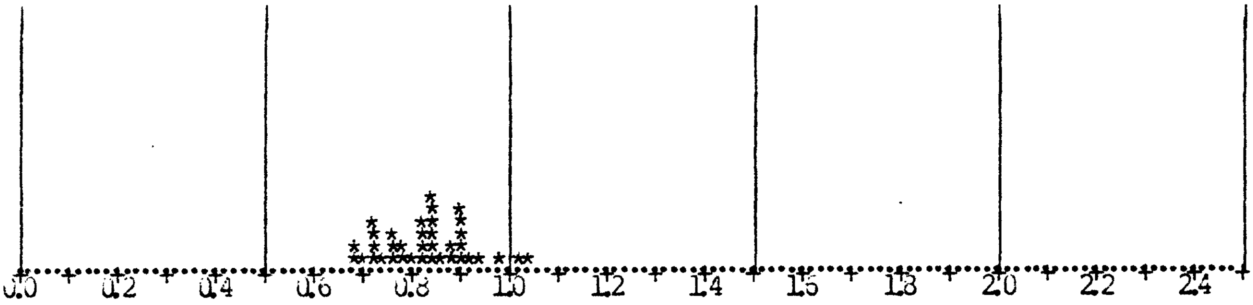


```
Pick: .5 Alt. Prob. 66 to PA IV+pgn=+

U.S.G.S. OF- 659        Project: Gautier
              Other No. 81-190  Mean Depth:     0.00 meters
 Well or section:               0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 15IV84  Time:  co   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

21~~8~~74

14

```
Supposed to be a coal,  more accurate would be a carb shale.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.69 0.69 0.71 0.72 0.73 0.73 0.73 0.75 0.76 0.76 0.77 0.78 0.78 0.81 0.82 0.82 0.83 0.83 0.84 0.84
 0.85 0.85 0.85 0.85 0.87 0.88 0.89 0.90 0.90 0.91 0.91 0.91 0.93 0.95 0.98 1.04 1.04
Minimum      0.69           N               37          Std.Dev.      0.09
Midrange     0.87           Mean          0.84          Variance      0.01
Maximum      1.04           Median        0.84          Range         0.35
Class   .    0.02
```

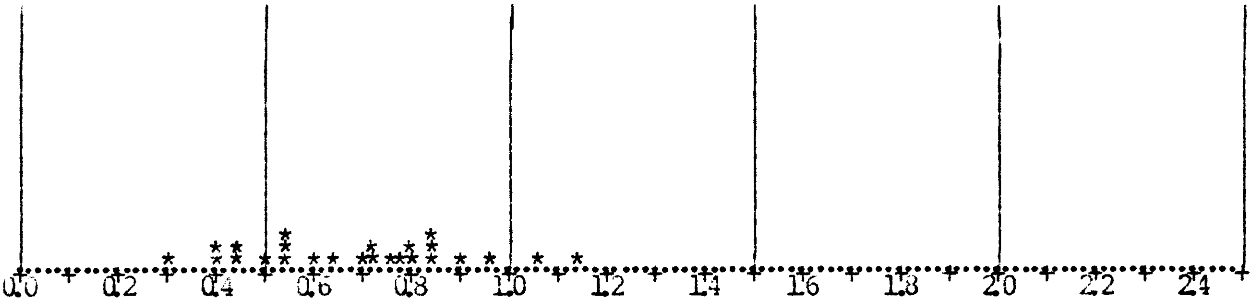


```
Pick: .72 Alt..84 Prob. LG  to  PASLV+pgn=+


U.S.G.S. OP-        Project: Gautier
                  Other No.   Mean depth:      0.00 meters
 ell or section:    191        0.00 feet
Sample Type: coree,  ,  Prep: coal
Date: 12III84  Time:  to  Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

14) Champlin 343 Amoco A , 30/[illegible]4

Tough slide to make out. There are two populations of vitrinite in the slide and there is also a big difference between the two. The high Ro group is around .7 to .9 Ro and the lower is from about .4 to .55. The lower Ro material unfortunately has a poor polish, almost a corroded look about it which makes taking ro readings tenuous. This group appears to be the representat though. The high Ro pieces are good, showing no weathering or transportation affects, just that they are too high. I believe the lower Ro population is correct.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.31 0.40 0.40 0.45 0.45 0.50 0.54 0.54 0.54 0.60 0.65 0.70 0.72 0.73 0.76 0.79 0.80 0.81 0.84 0.84
 0.85 0.90 0.97 1.07 1.17
Minimum     0.31          N             25        Std.Dev.     0.21
Midrange    0.74          Mean        0.69        Variance     0.04
Maximum     1.17          Median      0.72        Range        0.86
Class  .    0.02
```

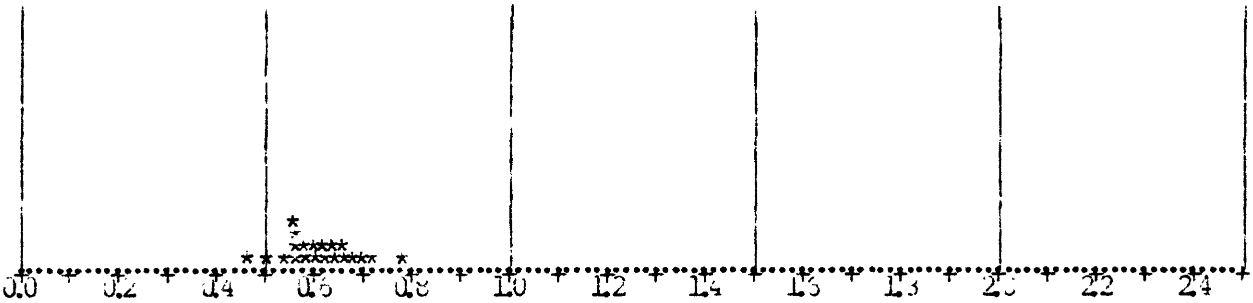


```
Pick· .4 Alt. Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-        Project: Gautier
                Other No.    Mean depth:      0.00 meters
 ell or section: L1-209    0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 9III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end  .00
```

414

124) Champlin 343 ...

```
Good vitrinite was sparse in this slide.  There was some of the unusuual
materila in this slide, that which doesnot polish and looks like bitumin.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.46 0.50 0.54 0.56 0.56 0.57 0.57 0.59 0.59 0.61 0.61 0.62 0.63 0.64 0.64 0.67 0.67 0.69 0.70 0.73
 0.80
Minimum     0.46             N            21          Std.Dev.     0.07
Midrange    0.63             Mean       0.62          Variance     0.01
Maximum     0.80             Median     0.61          Range        0.34
Class  .    0.02
```



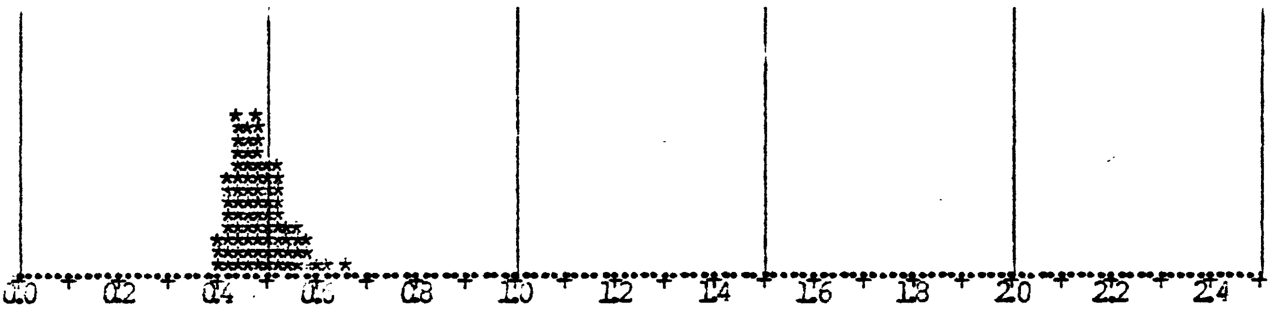
```
Pick  ..5 Alt. Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-         Project: Gautier
                 Other No. 41-210  Mean Depth:       0.00 meters
 ell or section:              0.00 feet
Sample Type: core.  ,  Prep: acid mac.
Date: 10I.84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

(39) (TS) #1 Rousselle 1of2

20-11N-54W

0.48

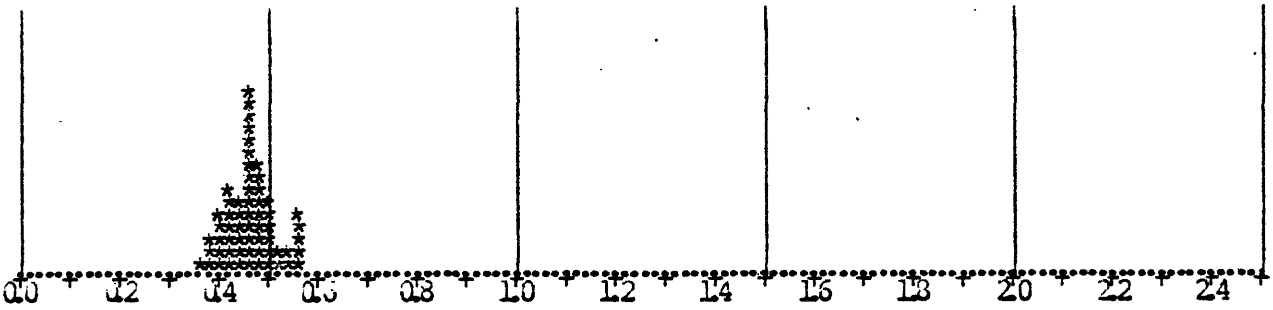
```
Good structured vitrinite.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.40 0.41 0.41 0.42 0.42 0.42 0.42 0.42 0.43 0.43 0.43 0.44 0.44 0.45 0.45 0.45 0.45 0.45 0.45 0.45
 0.45 0.45 0.45 0.45 0.45 0.46 0.46 0.46 0.46 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.48 0.48 0.48 0.48
 0.48 0.49 0.49 0.49 0.49 0.49 0.49 0.49 0.49 0.50 0.50 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.52 0.52
 0.52 0.52 0.52 0.52 0.53 0.53 0.53 0.54 0.55 0.55 0.55 0.56 0.57 0.57 0.57 0.58 0.58 0.59 0.60 0.62
 0.68
Minimum     0.40        N           81        Std.Dev.     0.05
Midrange    0.54        Mean      0.49        Variance     0.00
Maximum     0.68        Median    0.48        Range        0.28
Class W.    0.02
```



```
Pick: .48 Alt. Prob. LG  to  PASLV+pgn=+


U.S.G.S. OF-        Project: Gautier
                Other No. 11-15//CO-84-19  Mean depth:      0.00 meters
Well or section: J sandstone           0.00 feet
Sample Type: O/C,  ,  Prep: acid mac.
Date: 2VIII84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .
```

(.39) #1 Rousselle 242
⑮

```
Goood slide.  Organics are common and certainly terrigenous material.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.37 0.38 0.38 0.39 0.40 0.40 0.41 0.41 0.41 0.42 0.42 0.42 0.43 0.43 0.43 0.43 0.44 0.44 0.44 0.45
 0.45 0.45 0.46 0.46 0.46 0.46 0.46 0.46 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.48 0.48 0.48
 0.49 0.49 0.49 0.49 0.49 0.49 0.50 0.50 0.50 0.50 0.51 0.51 0.53 0.53 0.54 0.54 0.56 0.57 0.57 0.57
 0.57
Minimum     0.37          N            61        Std.Dev.     0.05
Midrange    0.47          Mean       0.47        Variance     0.00
Maximum     0.57          Median     0.47        Range        0.20
Class W.    0.02
```



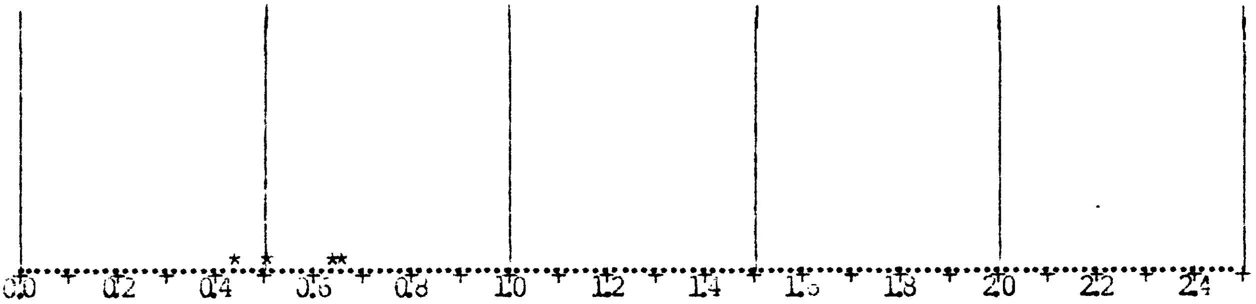
```
Pick: .47 Alt. Prob. LG  to  PASLV+pgh=+

U.S.G.S. OP-        Project: Gautier
                 Other No. 11-21**CO-84-20  Mean depth:     0.00 meters
Well or section: J sandstone           0.00 feet
Sample Type: O/C,  ,  Prep: acid mac.
Date: 6VIII84  Time:  to  Analyst:  MJP
Standard used: Sa-16,  Standard change at end:
```

42

16) Foster   16/2

Despite the low readings, they were taken on some good vitrinite. I believe the values to be representative. The sample itself was a whole rock sample which had not been properly treated. It should have been ground into smaller pieces. This time the rock eroded during polishing giving severe relief problems.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.45 0.51 0.64 0.68
Minimum     0.45        N             4        Std.Dev.     0.08
Midrange    0.57        Mean       0.57        Variance     0.01
Maximum     0.68        Median     0.58        Range        0.23
Class  .    0.02
```

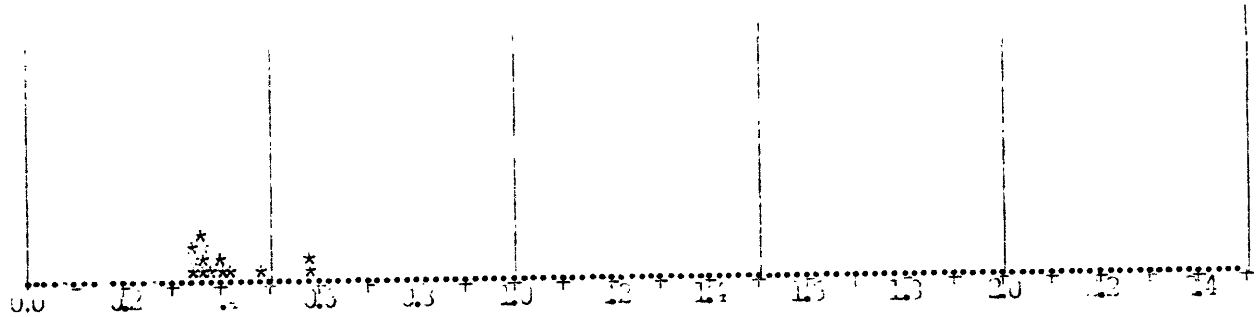


```
Pick: .64 Alt  Prob. LG  to  PASLv+pgh=+

U.S.G.S. OP-        Project: Gautier
                 Other No.   Mean depth:     0.00 meters
 Well or section:  222      0.00 feet
Sample Type: core,  ,  Prep: whl. rk.
Date: 8III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end  .00
```

16

Slide # 223 is barren. No recovery of the vitrinite.

```
Poor slide.  Organics are sparse [illegible] the material is not that good in terms
of being distinctive.  Quite likely the low Ro material is exinite.  Believe
that the representative Ro is higher, abt  .6 to .70

*****************ORDERED REFLECTANCE VALUES*****************
 0.34 0.34 0.35 0.36 0.36 0.37 0.37 0.39 0.40 0.41 0.43 0.48 0.59 0.59
 Minimum      0.34         N             14          Std.Dev.      0.08
 Midrange     0.47         Mean        0.41          Variance      0.01
 Maximum      0.59         Median      0.38          Range         0.25
 Class I.     0.02
```



```
Pick: .6 At: [illegible] from 13 to 24 [illegible]

[illegible] 82-          Project:
               Other No. 11-20**CO-84-21     Mean depth:      0.00 meters
  Well or section:                0.00 feet
Sample type: ,  Gautier,  Prep: acid mac.
Date: 12II05  [illegible] to  Analyst: [illegible]
Standard used: [illegible]-16,  standard change at end.
```

*48

(17) Pence Ranch #1
16-16N-62W
7958'

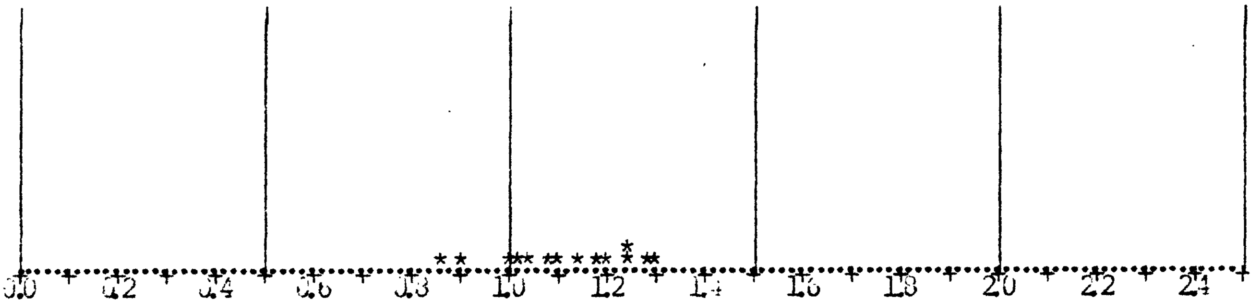
.6

45

18) State 2-16

A sparse slate. Only several pieces of note. These were quite small and they were similar in appearance and character. Pieces were too small to have structure.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.87 0.91 1.01 1.02 1.05 1.09 1.11 1.15 1.19 1.21 1.24 1.25 1.30 1.30
Minimum     0.87         N             14        Std.Dev.     0.13
Midrange    1.09         Mean        1.12        Variance     0.02
Maximum     1.30         Median      1.13        Range        0.43
Class  .    0.02
```

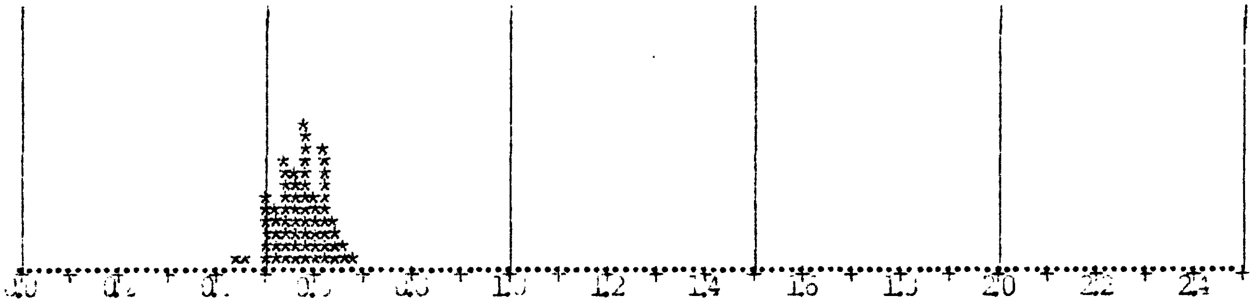


```
Pick: 1.0 Alt. Prob. LG  t-  PASLv+ngn=+


U.S.G.S. OP-         Project: Gautier
                Other No.    Mean depth:      0.00 meters
 Well or section:   117     0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 13III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

18) State 1-16

213

```
Good slide.  Organics are common and consistent in color.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.45 0.46 0.50 0.50 0.50 0.50 0.51 0.51 0.52 0.52 0.52 0.53 0.53 0.54 0.54 0.54 0.54 0.54 0.55 0.55
 0.55 0.55 0.56 0.56 0.56 0.56 0.57 0.57 0.57 0.57 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.59
 0.59 0.59 0.60 0.60 0.60 0.61 0.61 0.61 0.62 0.62 0.62 0.62 0.62 0.63 0.63 0.63 0.63 0.63 0.65 0.65
 0.65 0.65 0.66 0.67 0.68
Minimum     0.45           N              65          Std.Dev.      0.05
Midrange    0.57           Mean         0.58          Variance      0.00
Maximum     0.68           Median       0.58          Range         0.23
Class  .    0.02
```

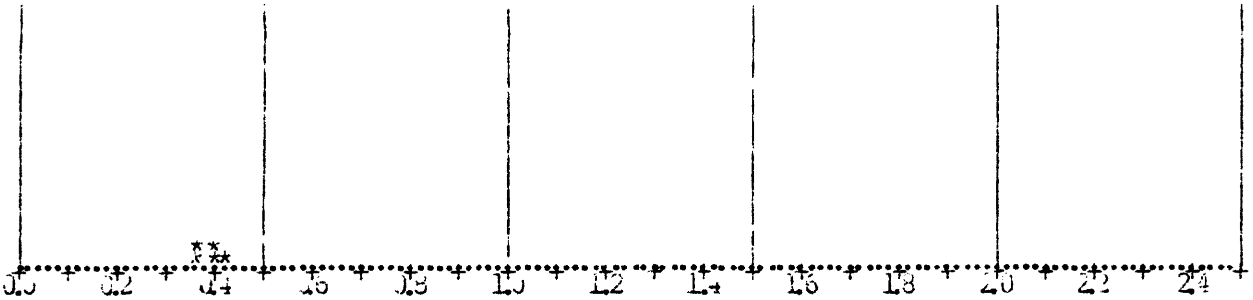


```
Pick: .58 Alt. Prob. LG  to  PASLV+sqn=+


U.S.G.S. OP-         Project: Gautier
                  Other No     Mean depth:      0.00 meters
 Well or section: P 121        0.00 feet
Sample Type: core,  ,  Prep: acid anc.
Date: 8III84  Time:  to   Analyst:    JP
Standard used: Sa-16,  Standard change at end: .00
```

18) STATE 1-16

3 of 3

```
very sparse slide, but there were several very good pieces of structured vitrini

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.36 0.36 0.40 0.41 0.42
Minimum      0.36            N              5          Std. Dev.     0.02
Midrange     0.39            Mean        0.39          Variance      0.00
Maximum      0.42            Median      0.40          Range         0.06
Class   .    0.02
```



```
Pick: .40 Alt. Prob. LG  to  PASLV+bqn=+


U.S.G.S  OF-         Project: Gautier
                Other No. D-125  Mean Depth:      0.00 meters
 Well or section:             0.00 feet
Sample Type: core    ,  Prep: acid mac.
Date: 10Nov84  Time:   to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

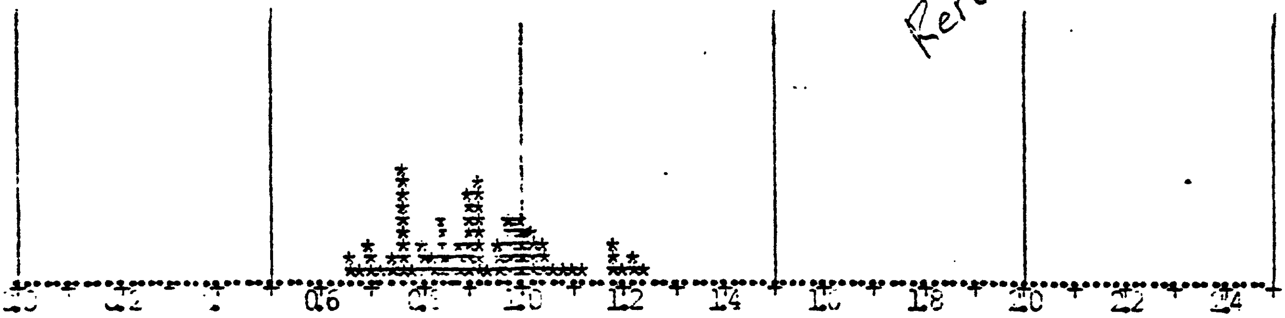
19) 2 Champlin 117 1 of 2

Pick .80

Fair slide. Organics are common, though the selection of the low Ro material was somewhat difficult. The pieces are all monomaceralic and structureless. and dispersed throughout the abundant mineral matter. The mean Ro value should probably be a few points lower, but the polish on the material prevented reading of the lower Ro pieces.

```
*******************] ORDERED REFLECTANCE VALUES [*****************
 0.66 0.66 0.66 0.70 0.70 0.71 0.73 0.74 0.75 0.76 0.76 0.76 0.76 0.76 0.76 0.77 0.77 0.77 0.79 0.80
 0.80 0.80 [illegible] 0.83 0.84 0.84 0.84 0.84 0.84 0.86 0.87 0.88 0.89 0.89 0.90 0.90 0.90 0.90 0.91 0.91
 0.91 0.92 0.92 0.92 0.92 0.92 0.93 0.93 0.93 0.95 0.96 0.96 0.97 0.98 0.98 0.99 0.99 0.99 1.00 1.00
 1.00 1.01 1.01 1.02 1.02 1.03 1.03 1.05 1.05 1.05 1.06 1.09 1.11 1.12 1.18 1.18 1.19 1.20 1.22 1.23
 1.26
Minimum    0.66          N            81         Std.Dev.    0.14
Midrange   0.96          Mean       ~~0.92~~     Variance    0.02
Maximum    1.26          Median     ~~0.91~~     Range       0.60
Class W.   0.02
```

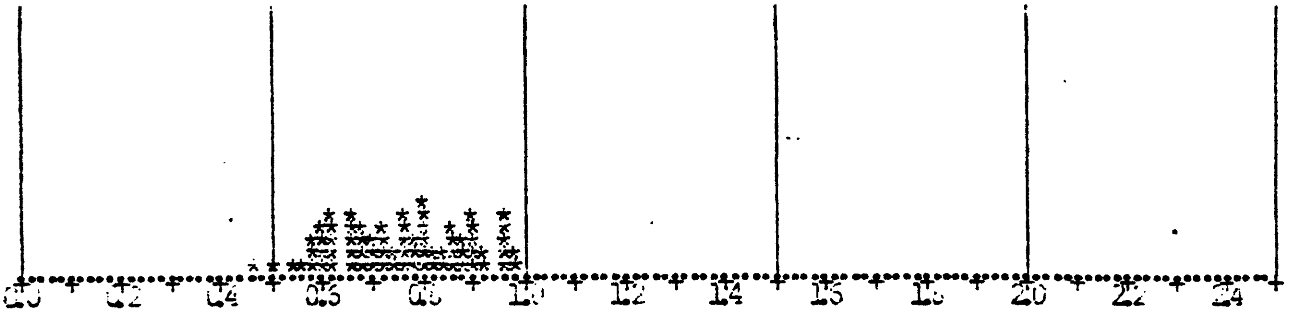
Rerun done



```
Pick: 80 Alt..90 Prob. LG  to  PASLV+pgh=44547+515


U.S.G.S. DP- 565-O       Project: Rice/Wattenberg
                   Other No. A-22-C  Mean depth:  1419.76 meters
Well or section: [redacted]         4658.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 5X31  Time: 2:1[illegible] to 2:40  Analyst:   MJP
Standard used: SA-16,  Standard change at end: .00

Data file 194    Track No.   0    Tape No.  24
DP-565-O/A-22-C/P.80/.90/N31/S.0[illegible]/M0.91/core/acid mac./5X31/MJP/F194T2..0/PASLvpgh=44547+515//

Info file 195    Track  0    Tape  24
```

(19) 2 champ

```
Organics are common, though the low gray material is much less so.  The pieces
are small to v. small, structureless and monomaceralic.  Their identity as
vitribite is certain.  Mineral matter is v. v. abundant as is the v. fine
X'line pyrite.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.46 0.51 0.56 0.57 0.58 0.59 0.59 0.60 0.60 0.60 0.61 0.62 0.62 0.63 0.63 0.63 0.66 0.66 0.66 0.67
 0.67 0.68 0.69 0.69 0.69 0.70 0.70 0.71 0.72 0.73 0.73 0.73 0.74 0.75 0.75 0.77 0.77 0.77 0.77 0.78
 0.78 0.79 0.80 0.80 0.80 0.80 0.80 0.80 0.82 0.82 0.84 0.85 0.86 0.86 0.87 0.87 0.88 0.88 0.89 0.90
 0.90 0.90 0.90 0.91 0.93 0.93 0.96 0.96 0.97 0.97 0.97 0.98 0.99
Minimum     0.46          N            73          Std.Dev.     0.13
Midrange    0.73          Mean       0.76          Variance     0.02
Maximum     0.99          Median     0.77          Range        0.53
Class  .    0.02
```



```
Pick: .68 Alt..75 Proc. LG  to  PASLV+pgh=55467+616

             rerun of 5X81
U.S.G.S. OP- 565-O          Project: Rice/Wattenberg
                  Other No. A220  Mean depth:  1419.76 meters
Well or section: [redacted]                4658.00 feet
Sample type: core,  ,  Prep: acid mac.
Date: 5X81  Time: 10:20 to 11:20  Analyst:   MJP
Standard used: SA-16,  Standard change at end: .00

Data file 206     Track No.   0     Tape No.  24
OP-565-O/A220/P.68/.75/N73/S.00/ Med.77/core/acid mac./5X81/MJP/F206T24.0/PASLVpgh=55467+616/rerun of 5X81/

Info file 207    Track   0    Tape  24
```

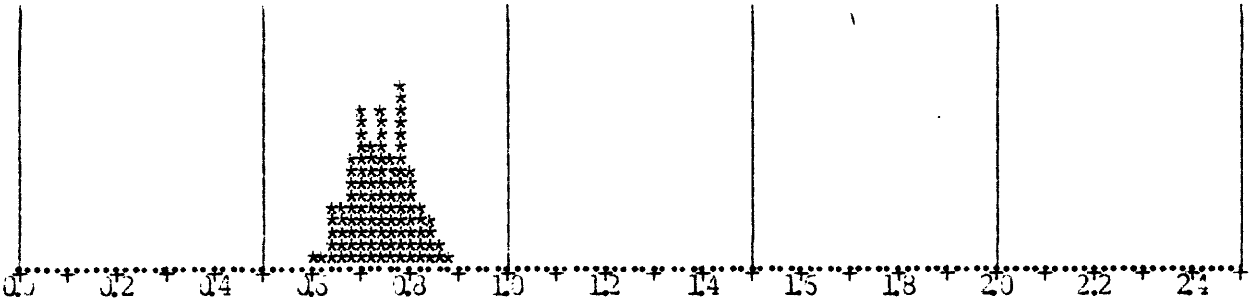
New

50

20) J.E. Dahlinger 1 of 3

108, 113, 114

```
[illegible] County [illegible] Organics [illegible]

******              | ORDERED REFLECTANCE VALUES |

[illegible]

Minimum     0.61          N            101          Std.Dev.      0.06
Midrange    0.75          Mean        0.75          Variance      0.00
Maximum     0.89          Median      0.74          Range         0.28
Class  .    0.02
```

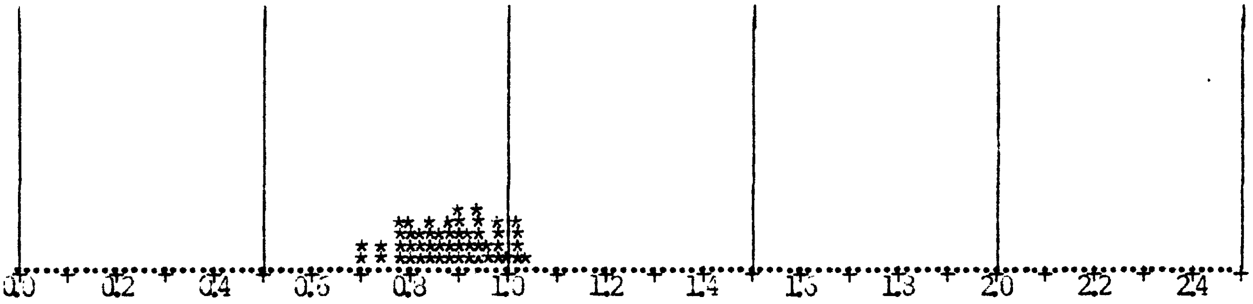


```
Pick: .74 Alt. Prob. LG  to  PASLV+pgh=+

U.S.G.S. OP-        Project: Gautier
                Other No.   Mean depth:     0.00 meters
Well or section:  108     0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 13III84  Time:  to  Analyst:  MJP
Standard used: Sa-16,  Standard change at end: .00
```

20)

2.13

```
Good slide.  Orgaanics are abundant, though it took a while to locaate the
low Ro material.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.70 0.70 0.74 0.75 0.78 0.78 0.79 0.79 0.80 0.80 0.80 0.80 0.82 0.82 0.83 0.84 0.84 0.84 0.85 0.86
 0.86 0.87 0.88 0.88 0.89 0.89 0.90 0.90 0.90 0.91 0.91 0.92 0.93 0.93 0.94 0.94 0.94 0.95 0.95 0.97
 0.97 0.98 0.98 0.99 0.99 1.01 1.02 1.02 1.02 1.02 1.06
Minimum     0.70        N              51        Std.Dev.     0.09
Midrange    0.88        Mean         0.89        Variance     0.01
Maximum     1.06        Median       0.89        Range        0.36
Class  .    0.02
```



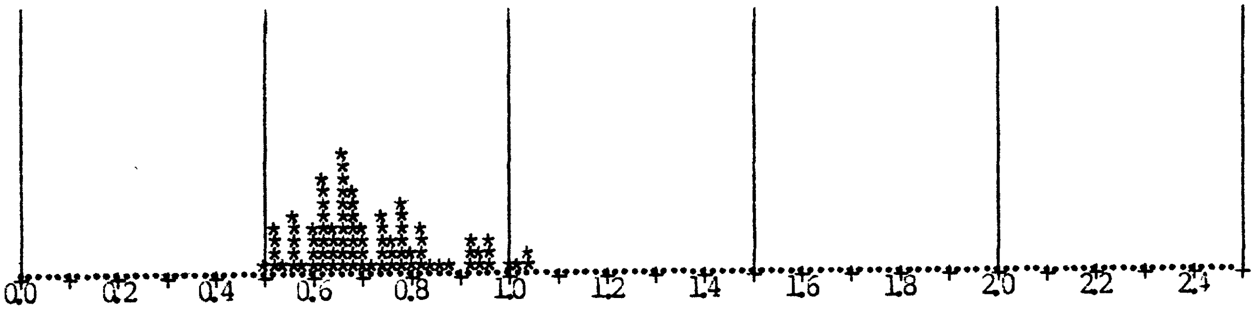
```
Pick: .80 Alt. Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-        Project: Gautier
                 Other No.   Mean depth:      0.00 meters
 ell or section:    113      0.00 feet
Sample Type: core,  ,  Prep: acid mac,
Date: 12III84  Time:  to   Analyst:    MJP
Standard used: Sa-16,  Standard change at end: .00
```

~8'
thin ^sh between J2 +
J3 channel SSTS.

(21) SHEETZ #6 4316' Depth
23-3S-52W

Good slide. Organics are common and consisttent in color and physical characteristics. There is some varieation in the material, some low Ro material with good structure was the representative material for the slide. Higher Ro material was passed over. Clean preparation.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.50 0.52 0.52 0.52 0.53 0.54 0.56 0.57 0.57 0.57 0.57 0.59 0.60 0.60 0.60 0.60 0.62 0.62 0.62 0.62
 0.63 0.63 0.63 0.63 0.64 0.64 0.64 0.65 0.66 0.66 0.66 0.66 0.66 0.67 0.67 0.67 0.67 0.67 0.68 0.68
 0.68 0.69 0.69 0.69 0.69 0.70 0.70 0.71 0.71 0.72 0.74 0.74 0.75 0.75 0.75 0.76 0.76 0.77 0.78 0.78
 0.78 0.78 0.78 0.79 0.81 0.81 0.82 0.83 0.83 0.83 0.85 0.87 0.89 0.92 0.92 0.93 0.94 0.95 0.96 0.97
 0.97 1.00 1.02 1.04 1.05
Minimum     0.50        N             85        Std.Dev.     0.13
Midrange    0.78        Mean        0.72        Variance     0.02
Maximum     1.05        Median      0.69        Range        0.55
Class  .    0.02
```



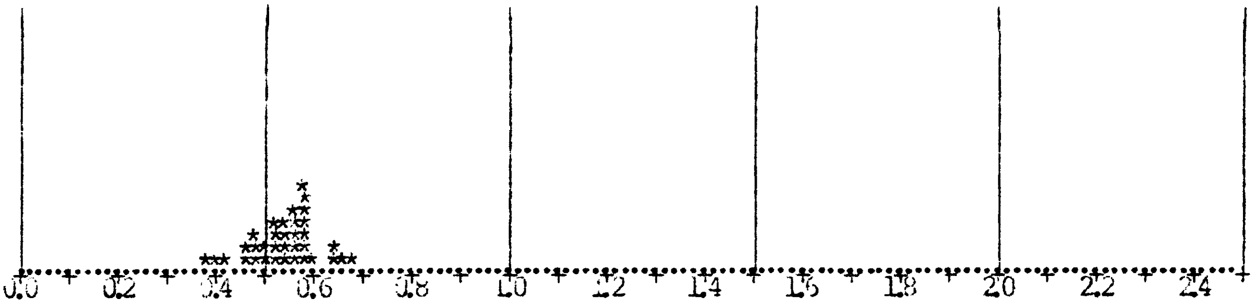
```
Pick: .67 Alt. Prob. LG  to  PASLV+pgh=75688+212
```

B

```
U.S.G.S. OP- 659-B/M-715        Project: Gautierr
                  Other No. CO-83-32-C1  Mean depth:       0.00 meters
 ell or section:            0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 6XII83  Time:  to  Analyst:   MJP
Standard used: ,  Standard change at end: .00
```

21) Sheetz *6

```
Good slide.

******************] ORDERED REFLECTANCE VALUES [*****************
 0.39 0.40 0.42 0.47 0.47 0.48 0.48 0.49 0.50 0.50 0.52 0.52 0.52 0.53 0.54 0.54 0.55 0.55 0.56 0.56
 0.57 0.57 0.57 0.58 0.58 0.58 0.58 0.59 0.59 0.59 0.61 0.64 0.65 0.66 0.68
Minimum      0.39          N                35          Std.Dev.      0.07
Midrange     0.54          Mean          0.54          Variance      0.00
Maximum      0.68          Median        0.55          Range         0.29
Class   .    0.02
```

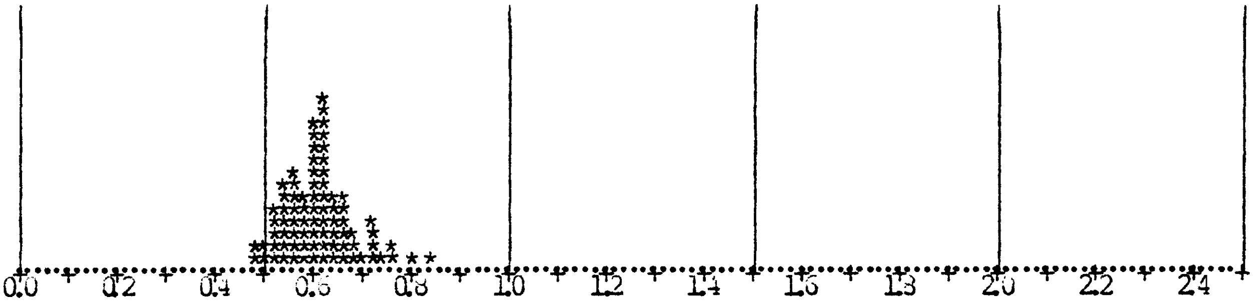


```
Pick: .55 Alt. Prob. LG  to  PASLV+Dgh=+


U.S.G.S. OP-        Project: Gautier
                Other No. G1-192  Mean depth:      0.00 meters
Well or section:             0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 10IV84  Time:  to   Analyst:   MJP
Standard used: Sa-16.  Standard change at end:
```

21) Sheety #6

3 of 3

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.48 0.49 0.51 0.51 0.52 0.53 0.53 0.53 0.53 0.54 0.54 0.55 0.55 0.55 0.55 0.55 0.56 0.56 0.56 0.56
 0.56 0.56 0.56 0.57 0.58 0.58 0.59 0.59 0.59 0.59 0.60 0.60 0.60 0.61 0.61 0.61 0.61 0.61 0.61 0.61
 0.61 0.61 0.62 0.62 0.62 0.62 0.62 0.63 0.63 0.63 0.63 0.63 0.63 0.63 0.63 0.63 0.64 0.65 0.65 0.65
 0.65 0.65 0.66 0.66 0.67 0.67 0.67 0.67 0.68 0.68 0.68 0.70 0.72 0.73 0.73 0.73 0.74 0.77 0.77 0.81
 0.86
Minimum     0.48          N             81          Std.Dev.     0.07
Midrange    0.67          Mean        0.62          Variance     0.01
Maximum     0.86          Median      0.61          Range        0.38
Class  .    0.02
```

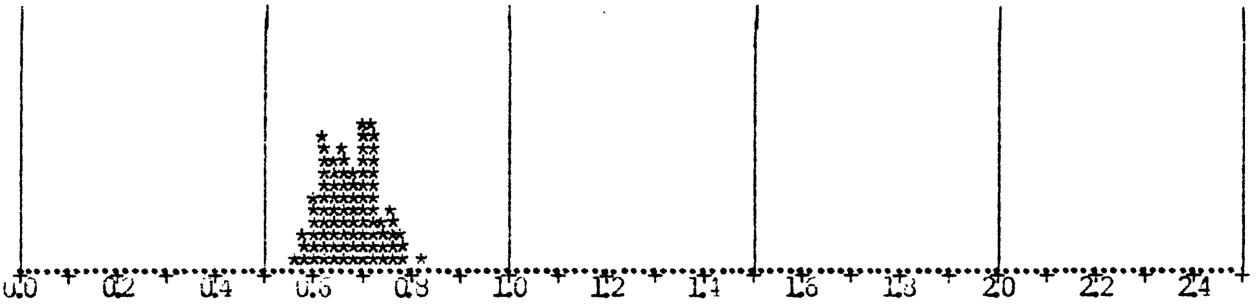


```
Pick: .62 Alt. Prob. LG  to  PASLv+pgh=+


U.S.G.S. OP-          Project: Gautier
                 Other No.   Mean depth:     0.00 meters
 Well or section:    193     0.00 feet
Sample Type: core,   ,  Prep: acid mac.
Date: 13III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

22) Calahan #1

1 of 3

```
Great slide.  lots of goodies.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.57 0.59 0.59 0.59 0.60 0.60 0.60 0.60 0.61 0.61 0.62 0.63 0.63 0.63 0.63 0.63 0.63 0.63 0.63 0.63
 0.63 0.64 0.64 0.64 0.64 0.64 0.64 0.64 0.64 0.65 0.66 0.66 0.66 0.66 0.67 0.67 0.67 0.67 0.67 0.67
 0.68 0.68 0.68 0.68 0.69 0.69 0.69 0.69 0.70 0.70 0.70 0.70 0.70 0.70 0.71 0.71 0.71 0.71 0.71 0.71
 0.72 0.72 0.72 0.72 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.74 0.74 0.74 0.75 0.76 0.76 0.77 0.77
 0.77 0.78 0.78 0.79 0.85
Minimum     0.57          N              85          Std.Dev.     0.06
Midrange    0.71          Mean         0.68          Variance     0.00
Maximum     0.85          Median       0.68          Range        0.28
Class  .    0.02
```

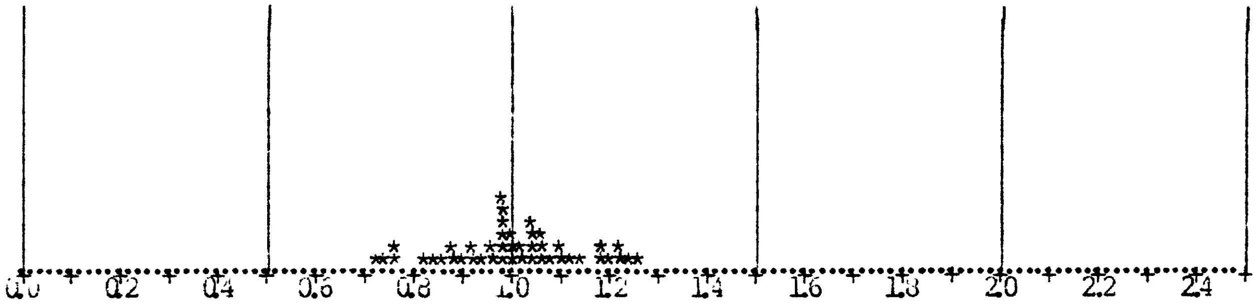


```
Pick: .68 Alt. Prob. LG  to  PAJLV+pgh=+


U.S.G.S. OP-         Project: Gautier
                Other No.   Mean depth:      0.00 meters
 ell or section:  B1 175   0.00 feet
Sample Type: core,   ,  Prep: acid mac.
Date: /III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

22) Calahan #1

262

```
Not a bad slide.  Just not much of the good stuff.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.73 0.74 0.76 0.77 0.82 0.84 0.87 0.88 0.89 0.90 0.92 0.93 0.95 0.96 0.97 0.98 0.98 0.99 0.99 0.99
 0.99 1.00 1.01 1.01 1.03 1.03 1.04 1.04 1.05 1.05 1.06 1.06 1.06 1.08 1.10 1.11 1.13 1.14 1.19 1.19
 1.20 1.22 1.23 1.27 1.27
Minimum     0.73         N              45        Std.Dev.     0.13
Midrange    1.00         Mean         1.01        Variance     0.02
Maximum     1.27         Median       1.01        Range        0.54
Class  .    0.02
```

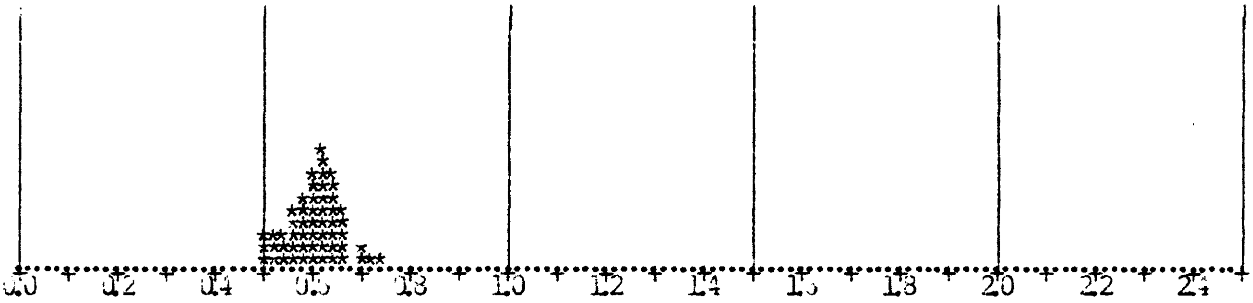


```
Pick: .98 Alt.1.1 Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-        Project: Gautier
                Other No.   Mean depth:      0.00 meters
 ell or section: C1 181     0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 7III84  Time:  to   Analvst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

22)

3/13

```
Coal.

******************] ORDERED REFLECTANCE VALUES [*****************
 0.51 0.51 0.51 0.52 0.52 0.53 0.55 0.55 0.55 0.56 0.56 0.56 0.57 0.57 0.58 0.58 0.58 0.58 0.59 0.59
 0.60 0.60 0.60 0.60 0.61 0.61 0.61 0.61 0.62 0.62 0.62 0.62 0.62 0.63 0.63 0.63 0.63 0.63 0.64 0.64
 0.65 0.65 0.65 0.65 0.65 0.65 0.66 0.66 0.66 0.67 0.6  0.70 0.70 0.73 0.76
Minimum      0.51          N              55          Std. Dev.      0.05
Midrange     0.64          Mean         0.61          Variance       0.00
Maximum      0.76          Median       0.61          Range          0.25
Class   .    0.02
```

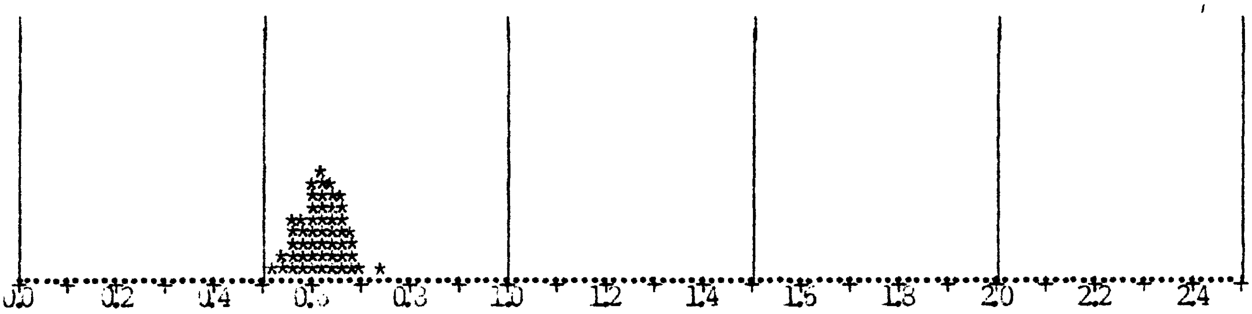


```
Pick: .61 Alt. Prob. LG to PASL/+ogh=+


U.S.G.S. OP          Project: Gaautier
                  Other No.   Mean depth:  2299.11 meters
 Well or section:CO 83-  7543.00 feet
Sample Type: core, 182-C Prep: coal
 Date: 7III84  Time:  to   Analyst:   MJP
Standard used: Sa-15,  Standard change at end: .00
```

58

23) Rhodes 'A' #1 16/3

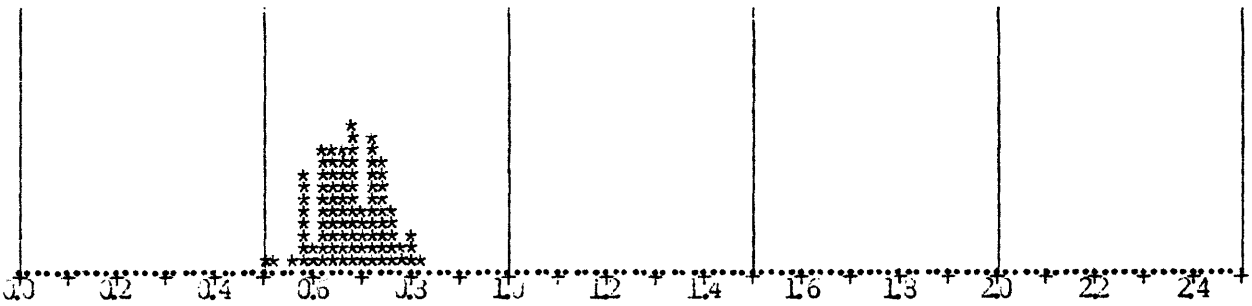
```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.52 0.54 0.55 0.55 0.56 0.56 0.57 0.57 0.58 0.59 0.59 0.59 0.59 0.60 0.60 0.60 0.60 0.60 0.61 0.61
 0.61 0.62 0.62 0.62 0.62 0.63 0.63 0.63 0.63 0.63 0.64 0.64 0.64 0.65 0.65 0.65 0.65 0.65 0.66 0.66
 0.67 0.67 0.67 0.67 0.67 0.68 0.68 0.69 0.69 0.70 0.75
Minimum      0.52          N              51          Std.Dev.      0.05
Midrange     0.64          Mean         0.62          Variance      0.00
Maximum      0.75          Median       0.63          Range         0.23
Class  .     0.02
```



```
Pick: .62 Alt. Prob. LG  to  PASLV+pgh=+


U.S.G.S. DP-        Project: Gautier
                 Other No. acid mac,  Mean depth:      0.00 meters
 ell or section: 142        0.00 feet
Sample Type: ,  ,  Prep: acid amc.
Date: 12III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

23) Rhodes 'A' #1 2 of 2

```
Good slide.

******************] ORDERED REFLECTANCE VALUES [******************
 0.50 0.53 0.55 0.58 0.58 0.58 0.58 0.59 0.59 0.59 0.59 0.61 0.61 0.62 0.62 0.62 0.62 0.63 0.63 0.63
 0.63 0.63 0.63 0.64 0.64 0.64 0.64 0.64 0.64 0.65 0.65 0.65 0.65 0.66 0.66 0.66 0.66 0.66 0.66 0.67
 0.67 0.67 0.67 0.68 0.68 0.68 0.68 0.68 0.68 0.68 0.68 0.69 0.69 0.69 0.69 0.70 0.70 0.70 0.71 0.71
 0.72 0.72 0.72 0.72 0.72 0.72 0.73 0.73 0.73 0.73 0.73 0.74 0.74 0.74 0.74 0.74 0.74 0.75 0.75 0.75
 0.76 0.76 0.77 0.77 0.77 0.78 0.78 0.81 0.81 0.81 0.82
Minimum     0.50          N              91        Std.Dev.     0.06
Midrange    0.66          Mean         0.68        Variance     0.00
Maximum     0.82          Median       0.68        Range        0.32
Class  .    0.02
```



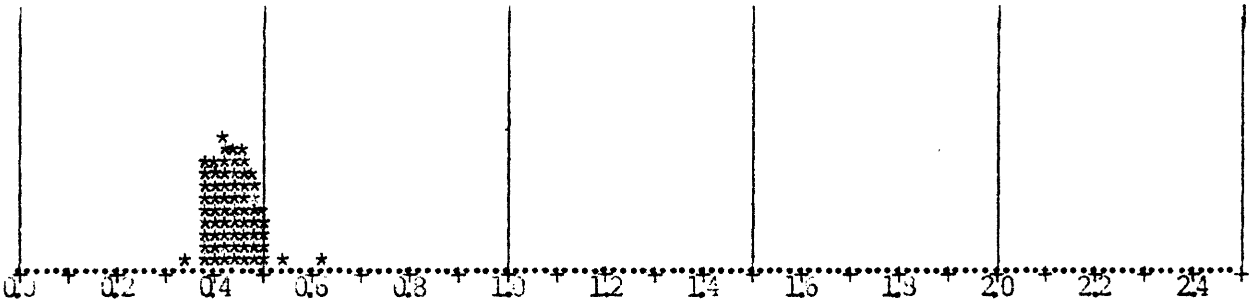
```
Pick: .65 Alt..70 Prob. LG  to  PA :Lv+pgn=+


U.S.G.S. OP-        Project: Gautier
                Other No.   Mean depth:      0.00 meters
 Well or section:     143    0.00 feet
Sample Type: core,   ,  Prep: acid mac.
Date: 13III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

60

23)

3 of 3

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.35 0.38 0.38 0.38 0.38 0.38 0.39 0.39 0.39 0.39 0.40 0.40 0.40 0.40 0.40 0.41 0.41 0.41 0.41 0.42
 0.42 0.42 0.42 0.42 0.43 0.43 0.43 0.43 0.43 0.43 0.44 0.44 0.44 0.44 0.44 0.45 0.45 0.45 0.45 0.45
 0.46 0.46 0.46 0.46 0.46 0.46 0.47 0.47 0.47 0.47 0.48 0.48 0.48 0.48 0.48 0.49 0.49 0.49 0.50 0.50
 0.51 0.51 0.51 0.55 0.64
Minimum      0.35            N              65          Std.Dev.      0.05
Midrange     0.50            Mean         0.44          Variance      0.00
Maximum      0.64            Median       0.44          Range         0.29
Class  .     0.02
```

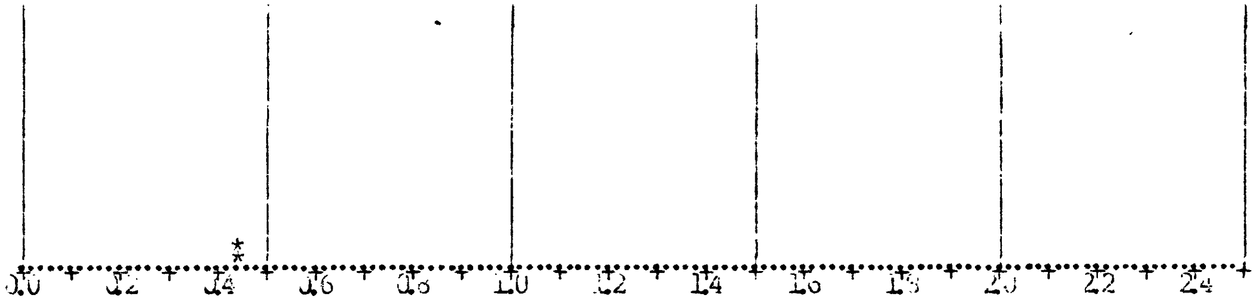


```
Pick: .44 Alt. Prob. LG  to  PASLV+pgn=+


U.S.G.S. OP-         Project: Gautier
                Other No.    Mean depth:      0.00 meters
 Well or section:  U-144    0.00 feet
Sample Type:  ,  ,  Prep: acid mac
Date: 9III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end:  00
```

24) #1 Anderson-Byrne 1 of 3

Another difficult slide to interpret. There appears to be vitrinite in this slide, but because of the very poor polish and one or two other intangibles, I believe the material to be bitumins. Probably the vitrinite comes in around Ro of .50 to .60.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.44 0.45
Minimum      0.44          N              2         Std.Dev.      0.00
Midrange     0.45          Mean        0.45         Variance      0.00
Maximum      0.45          Median      0.45         Range         0.01
Class  .     0.02
```



```
Pick: .30 Alt. Prob. [illegible] to R&SLV+pgh=+


U.S.G.S. OF-        Project: Gautier
                Other No. V-145  Mean depth:      0.00 meters
 Well or section:              0.00 feet
Sample Type: core,  ,  Prep: hcl  mac.
Date: 10IV84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

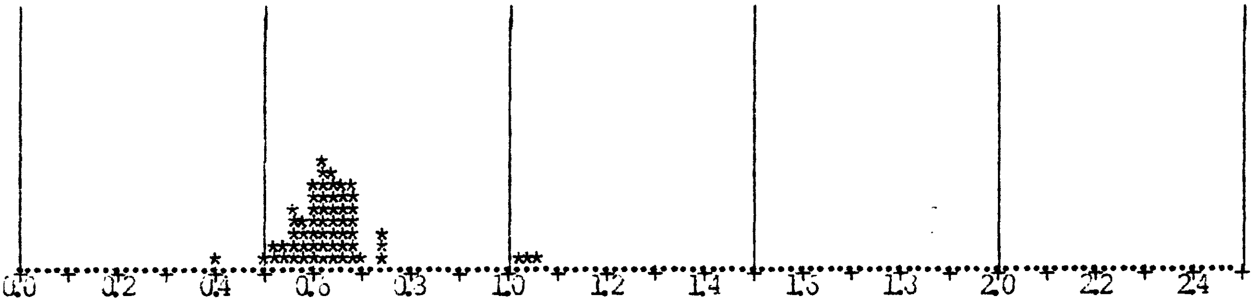
62

24)

243

pretty good slide? organics are common and consistent in color and character. Good structure in all the material.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.41 0.50 0.52 0.53 0.54 0.55 0.56 0.57 0.57 0.57 0.57 0.58 0.58 0.58 0.59 0.60 0.60 0.60 0.60 0.61
 0.61 0.61 0.62 0.62 0.62 0.62 0.63 0.63 0.63 0.63 0.63 0.64 0.64 0.64 0.64 0.64 0.65 0.65 0.65 0.66
 0.66 0.67 0.67 0.67 0.67 0.67 0.68 0.68 0.68 0.68 0.69 0.69 0.69 0.70 0.74 0.74 0.74 1.03 1.04 1.09

Minimum     0.41        N             60        Std.Dev.     0.11
Midrange    0.75        Mean        0.65        Variance     0.01
Maximum     1.09        Median      0.63        Range        0.68
Class  .    0.02
```

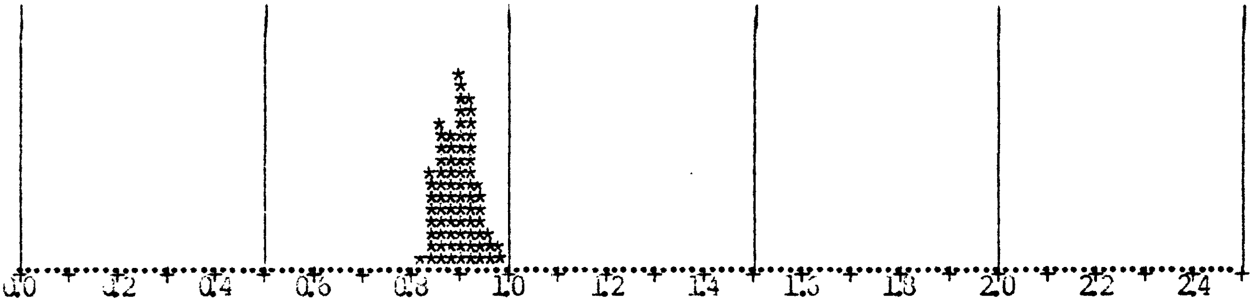


```
Pick: .62 Alt. Prob. LG  to  PA Lv+pgh=+


U.S.G.S. OP-        Project: Gautier
                 Other No.   Mean depth:     0.00 meters
 Well or section:  147     0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 13III84  Time:  to  Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

24)

3 of 3

```
Coal sample.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.83 0.84 0.84 0.85 0.85 0.85 0.85 0.85 0.85 0.86 0.86 0.86 0.86 0.86 0.86 0.87 0.87 0.87 0.87 0.87
 0.87 0.88 0.88 0.88 0.88 0.88 0.89 0.89 0.89 0.89 0.89 0.89 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90
 0.90 0.91 0.91 0.91 0.91 0.91 0.91 0.91 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.93 0.93
 0.93 0.93 0.94 0.94 0.94 0.94 0.94 0.95 0.95 0.96 0.96 0.96 0.98 0.99
Minimum      0.83           N             74          Std.Dev.      0.03
Midrange     0.91           Mean        0.90          Variance      0.00
Maximum      0.99           Median      0.90          Range         0.16
Class  .     0.02
```



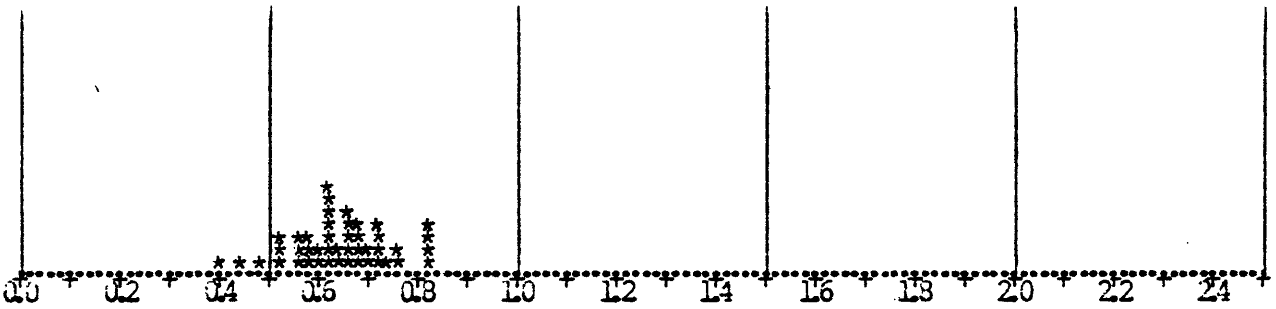
```
Pick: .90 Alt. Prob. LG  to  PASLV+ogh=+


U.S.G.S. OP-        Project: Gautier
                 Other No.    Mean depth:      0.00 meters
 Well or section:  83-156  0.00 feet
Sample Type: core,  ,  Prep: coal
Date: 0III84  Time:  to  Analyst:   MJP
Standard used: Ga-16,  Standard change at end: .00
```

15,16 RA.Rev

(93) (25) #1 STORY 32-6S-68W

1 of 2 (0.64 pick)

```
******************] ORDERED REFLECTANCE VALUES [******************
 0.40 0.45 0.48 0.52 0.53 0.53 0.56 0.56 0.57 0.59 0.59 0.59 0.60 0.61 0.62 0.62 0.62 0.62 0.63 0.63
 0.63 0.64 0.64 0.66 0.67 0.67 0.67 0.67 0.68 0.68 0.68 0.69 0.70 0.71 0.72 0.73 0.73 0.73 0.74 0.77
 0.77 0.82 0.82 0.83 0.83
Minimum      0.40          N             45         Std.Dev.     0.10
Midrange     0.62          Mean        0.65         Variance     0.01
Maximum      0.83          Median      0.64         Range        0.43
Class W.     0.02
```



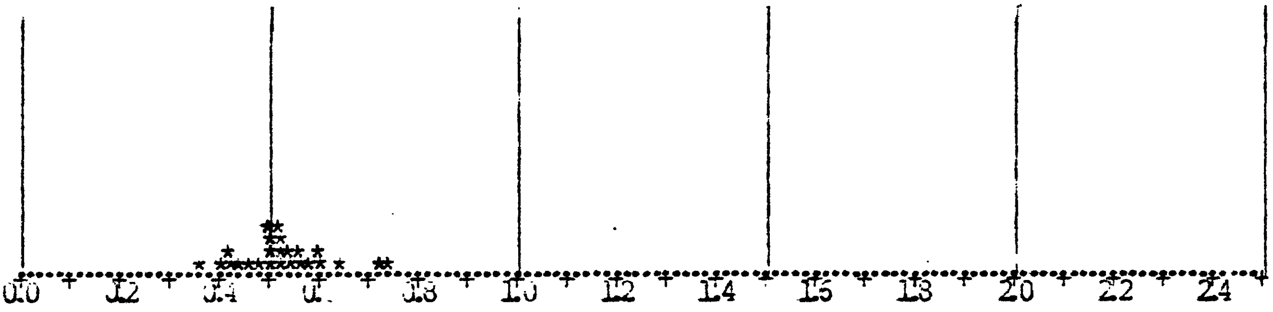
```
Pick: .64 Alt. Prob. LG  to  PASLV+pgn=+

U.S.G.S. OP-        Project: Gautier
                 Other No. 11-18**CO-84-17  Mean depth:     0.00 meters
Well or section: J sandstone           0.00 feet
Sample Type: O/C,  ,  Prep: acid mac.
Date: 6VIII84  Time:   to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end:
```

65

(25) #1 Story

32-6N-68 W

```
Fair slide.  Polish on the orgganics was not too good, this would reduce the
Ro  about .05 to .07 from the  recorded values.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.37 0.40 0.42 0.42 0.45 0.47 0.48 0.50 0.51 0.51 0.51 0.52 0.52 0.53 0.53 0.55 0.55 0.56 0.57 0.58
 0.61 0.61 0.65 0.72 0.74
Minimum      0.37          N              25          Std.Dev.      0.09
Midrange     0.56          Mean         0.53          Variance      0.01
Maximum      0.74          Median       0.52          Range         0.37
Class W.     0.02
```



```
Pick: .58 Alt. Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-         Project: Gautier
              Other No. 11-17//CO-84-18  Mean depth:     0.00 meters
Well or section: J  Sandstone             0.00 feet
Sample Type: O/C,  ,  Prep: acid mac.
Date: 2VIII84  Time:  to  Analyst:  MJP
Standard used: Sa-16,  Standard change at end:
```

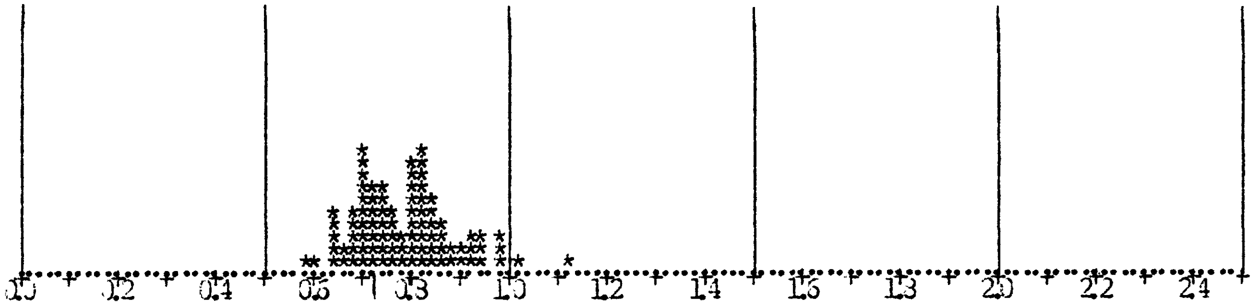
(26) SHELL 44-8
8-115-59 W

6217.5'

CBN BLK SH.,
BLEBBY
-MIDDLE J3-

~.67

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.59 0.61 0.64 0.64 0.64 0.65 0.65 0.67 0.67 0.68 0.69 0.69 0.69 0.69 0.70 0.70 0.70 0.70 0.70 0.70
 0.70 0.70 0.71 0.71 0.72 0.72 0.72 0.73 0.73 0.73 0.73 0.74 0.74 0.74 0.75 0.75 0.75 0.75 0.76 0.77
 0.77 0.77 0.77 0.78 0.79 0.79 0.80 0.80 0.80 0.80 0.81 0.81 0.81 0.81 0.81 0.82 0.82 0.82 0.82 0.83
 0.83 0.83 0.83 0.83 0.83 0.84 0.84 0.84 0.85 0.85 0.85 0.86 0.86 0.86 0.86 0.89 0.89 0.91 0.91 0.92
 0.93 0.93 0.94 0.95 0.95 0.98 0.98 0.99 1.03 1.14
Minimum      0.59         N               90        Std.Dev.      0.10
Midrange     0.87         Mean          0.79        Variance      0.01
Maximum      1.14         Median        0.79        Range         0.55
Class  .     0.02
```

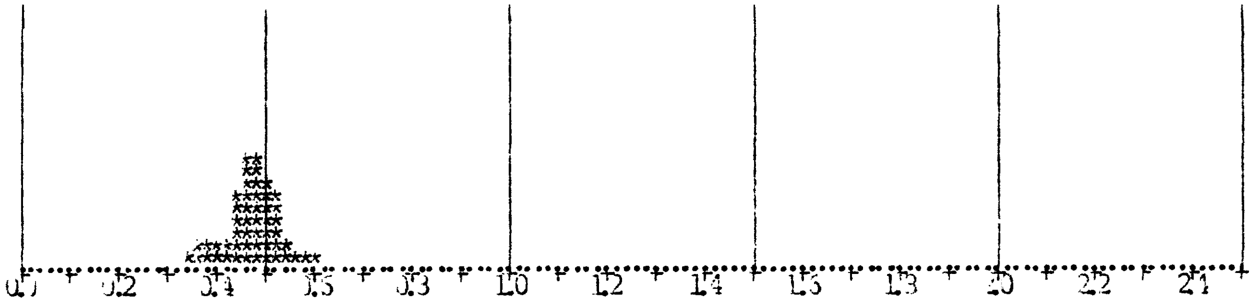


```
Pick: .79 Alt..83 Prob. LG  to  PASLV+pgn=76688+214
       72

U.S.G.S. OP- 659-D/M-717      Project: Gautier
               Other No. CO-83-40-C1  Mean depth:      0.00 meters
 Well or section: ~~G. . Steiner~~               0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 6XII83  Time:  to  Analyst:   MJP
Standard used: ,  Standard change at end: .00
```

26)

27.3

```
Sample is a poor coal.  The Ro readings are good, taken on nicely structured
vitrinite.
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.35 0.35 0.36 0.39 0.39 0.40 0.40 0.42 0.42 0.44 0.44 0.45 0.45 0.45 0.45 0.46 0.46 0.46 0.46 0.47
 0.47 0.47 0.47 0.47 0.48 0.48 0.48 0.48 0.48 0.48 0.49 0.49 0.49 0.50 0.50 0.50 0.50 0.50 0.51 0.51
 0.52 0.52 0.52 0.52 0.52 0.53 0.54 0.55 0.57 0.59 0.61
Minimum      0.35          N                51          Std.Dev.     0.05
Midrange     0.48          Mean           0.47          Variance     0.00
Maximum      0.61          Median         0.48          Range        0.26
Class  .     0.02
```

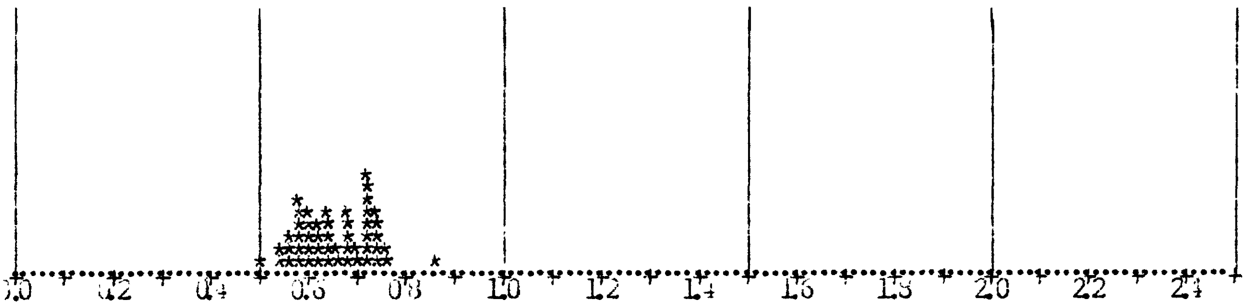


```
Pick: .47 Alt. Prob. LG  to  ?ASL7+pgh=+


U.S.G.S. OP-        Project: Gautier
                  Other  o. I4  106   Mean Depth        0.00 meters
Well or section:              0.00 feet
Sample Type: core,  ,  Prep: acid mac.
Date: 7II784  Time:  to   Analyst:   [illegible]
Standard used: Sa-16,  Standard change at end: .00
```

26)

3-13

```
Good sample.  Organics are common and quite similar.  Good low Ro material.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.51 0.55 0.55 0.56 0.56 0.57 0.58 0.58 0.59 0.59 0.59 0.59 0.60 0.60 0.61 0.61 0.61 0.62 0.63 0.63
 0.63 0.64 0.65 0.65 0.65 0.65 0.67 0.67 0.68 0.68 0.68 0.69 0.69 0.70 0.71 0.72 0.72 0.72 0.72 0.73
 0.73 0.73 0.73 0.74 0.74 0.74 0.74 0.75 0.76 0.77 0.88
Minimum     0.51          N              51          Std.Dev.     0.07
Midrange    0.70          Mean         0.66          Variance     0.01
Maximum     0.88          Median       0.65          Range        0.37
Class  .    0.02
```



```
Pick: .60 Alt  Prob. LG  to  PASLV+sgn=+

U.S.G.S. OP-         Project: Gautier
                Other ID.   Mean depth:      0.00 meters
 Well or section:     J1 197  0.00 feet
Sample type: core,  ,  Prep: acid mac.
Date: 7III84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

69

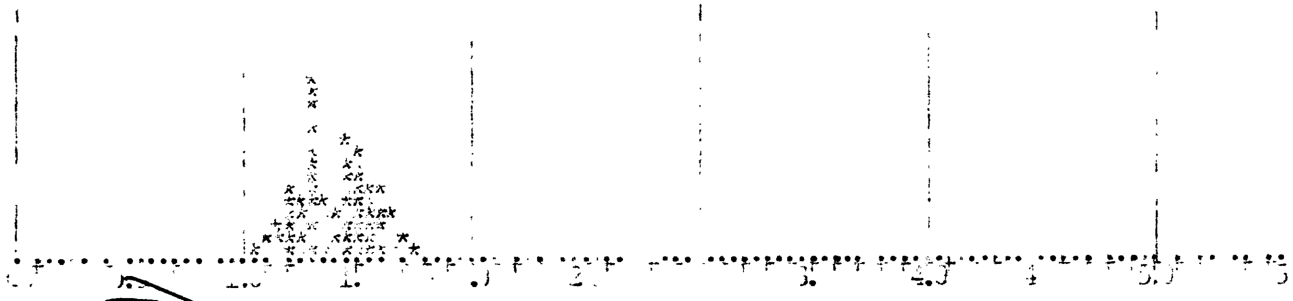
(27) CRESTVIEW ESTATES T2N-R71W NENE36
J SST COAL

SAMPLE # 48 BITUMEN - NO READINGS

[illegible]

[illegible]

N 81
Mean 1.45
Median 1.44



[illegible] 1.45 [illegible]

[illegible] 11-24 CO-84-49 [illegible]

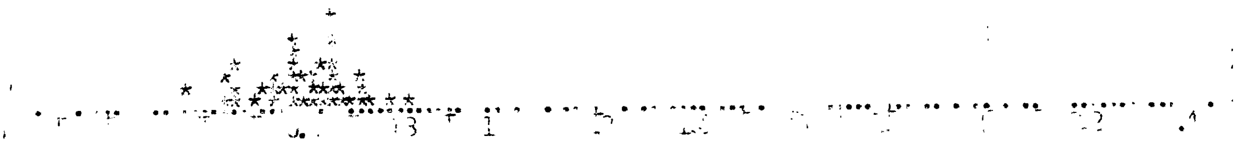
[illegible]

(28) Hygiene Dc 142

SE 36 T2N-R71W

pick .62

[illegible]



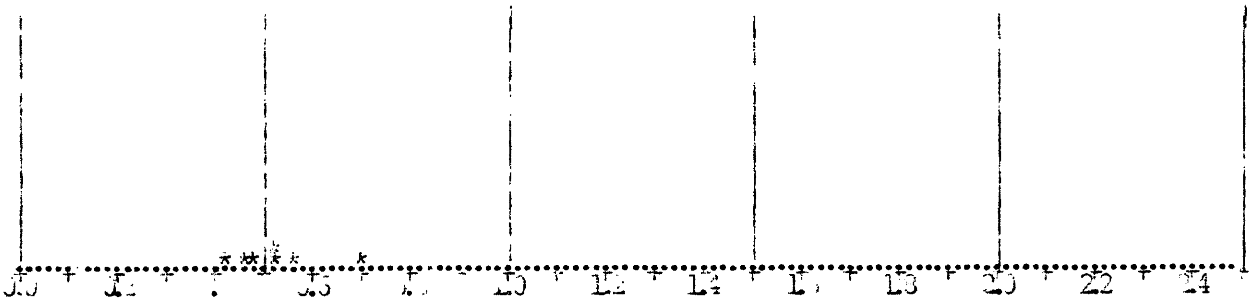
[illegible] .62 [illegible]

[illegible] 11-23* CO-84-50 [illegible]

[illegible]

(28) Hygiene Dr - Hwy 36 (242)
SE 36 T2N - R 71 W

```
****************[illegible][***************
0.43 0.47 0.48 0.51 0.5  0.56 0.72
Minimum     0.43                                  Std. Dev.    0.08
Hi range    0.53         Mean        0. 3         Variance     0. 1
Maximum     0.72         Median      0.52         Range        0.2
Class W.    0.0
```



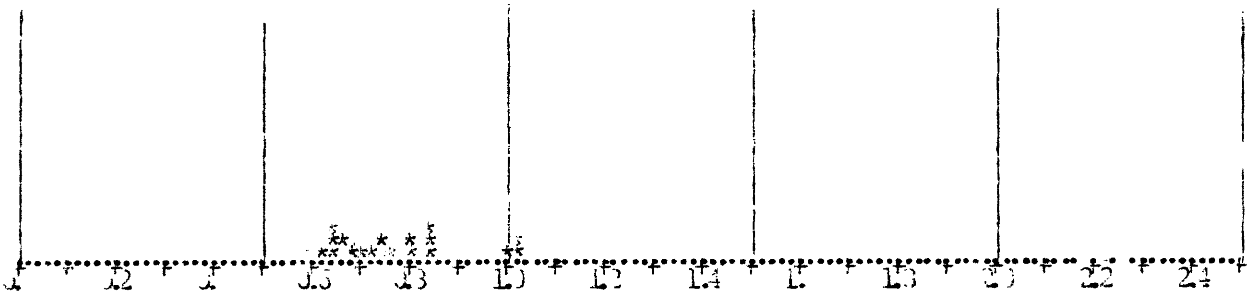
```
Pick: .53 Alt. Prob. [illegible] Ev+Dn+

U.S.G.S. Sp-          Proj Co: Gautier
                 Other No. 11-27**CO:84-51   Mean [illegible]:      0.01 meters
Width of Section:               0.0  feet
Sample Type: D/C,  ,  Prep: acid  ac.
Date: 27X[illegible]  Fi[illegible]  Analyst:  [illegible]
Standard [illegible] -16,   Standard change at [illegible]:
```

141

(29) T3N-R70W-S4 NE

Fair slide. There is some consistency between the organics in the slide, though. Mostly intermediate rank material, with some recycled organics.

```
*****************  ORDERED REFLECTANCE VALUES  [*****************
 0.59 0.62 0.65 0.65 0.6  0.67 0.67 0.65 0.69 0.  0 0.73 0.74 0.75 0.75 0.81 0.81 0.  4 0.85 0.   0.91
 1.02 1.02 1.03
Minimum      0.59          N             23         Std Dev.     0.12
Midrange     0.81          Mean        0.77         Variance     0.02
Maximum      1.03          Median      0.74         Range        0.44
Class        0. 2
```

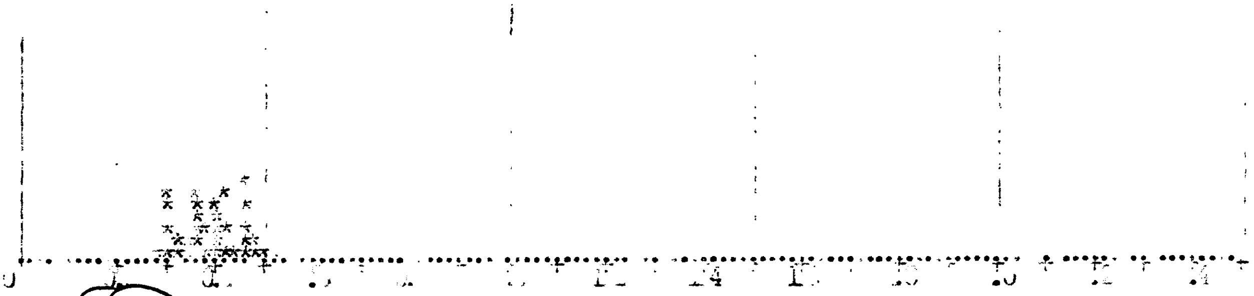


```
Pick  .68 At . Prob.        to  PAS  v+pgn=+

U.S.G.S.    -         Project  Frontier
              Other No. 11-29**C0-84-52V  Mean depth:       0.00 meters
Width of section:              0.0  feet
Sample type: O/C,  ,    Prep: acid mac
 Date: 7/18/84   Min :   to     Analyst :    JP
Standard used: SP-1 .   Standard change at end:
```

73

(30) Horsetooth Reservoir 1 of 1

```
[illegible] that 99[illegible] [illegible] [illegible]erial [illegible] recycled
[illegible] mostly [illegible]omaceralic m[illegible]terial [illegible]
[illegible] for [illegible]

****** ** ** ** [illegible] *.*** * * * *
[illegible] 0.30 0.31 [illegible] 0.31 [illegible] 0.33 0.33 [illegible] 0.37 0.37 0.
0.3 [illegible] 0.4 [illegible] 0.40 0.41 [illegible] 0.44 [illegible] 0.47 0.47
[illegible] 0.5[illegible]
[illegible]                    N            45           [illegible]
[illegible]                    Mean       0.39           [illegible]
[illegible]      0.5[illegible]       Median     0.40           [illegible]
Class [illegible]  0 0[illegible]
```

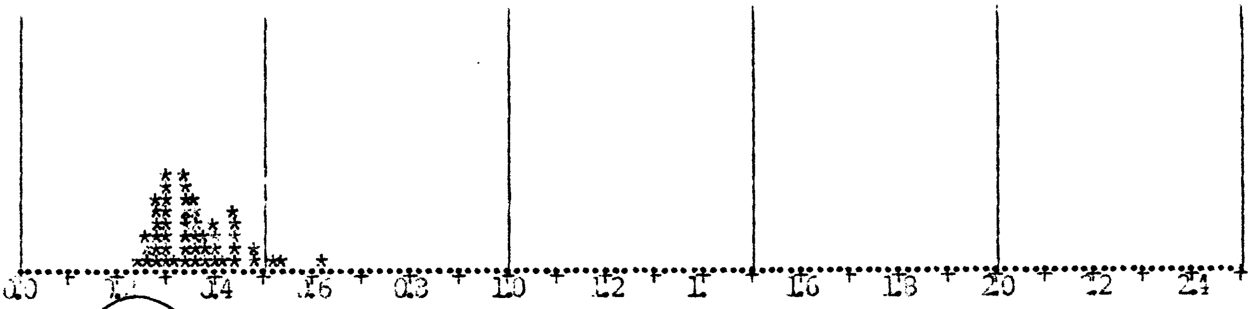


```
[illegible] .38 [illegible] . Pro . [illegible] v+bgh +

[illegible] r [illegible] t: [illegible] tier
            [illegible] 11-30**CO-84-56V [illegible] [illegible].00 meters
[illegible] section [illegible]
ample [illegible]
Da[illegible] 11/15/84 [illegible] [illegible]
[illegible] 16. [illegible]
```

192

(51) T7N-R69W-33 SWSW

```
*******************] ORDERED REFLECTANCE VALUES [*****************
 0.25 0.27 0.27 0.27 0.29 0.29 0.29 0.29 0.29 0.29 0.30 0.30 0.30 0.30 0.30 0.30 0.31 0.31 0.33 0.33
 0.34 0.34 0.34 0.35 0.35 0.35 0.35 0.36 0.36 0.37 0.37 0.37 0.37 0.38 0.38 0.39 0.41 0.41 0.41 0.41
 0.43 0.44 0.44 0.44 0.45 0.45 0.46 0.48 0.52 0.54 0.64
 Minimum    0.25         N              51         St .Dev.      0.08
Midrange    0.45         Mean         0.36         Variance      0.01
Maximum     0.64         Median  -    0.35         Range         0.39
Class W.    0.02
```



```
Pick: .34 Alt. Prob. LG to PA LV+pgn=+

U.S.G.S. OP-        Project: Gautier
                 Other No. 11-33**CO-84-57√  Mean depth:      0.00 meters
Well or section:               0.00 feet
Sample Type: O/C,  ,  Prep: acid  ac.
Date: 11/19/84  Time:  to   Analyst:   MJP
Standard used: SA-16,  Standard change at end: N
```

75

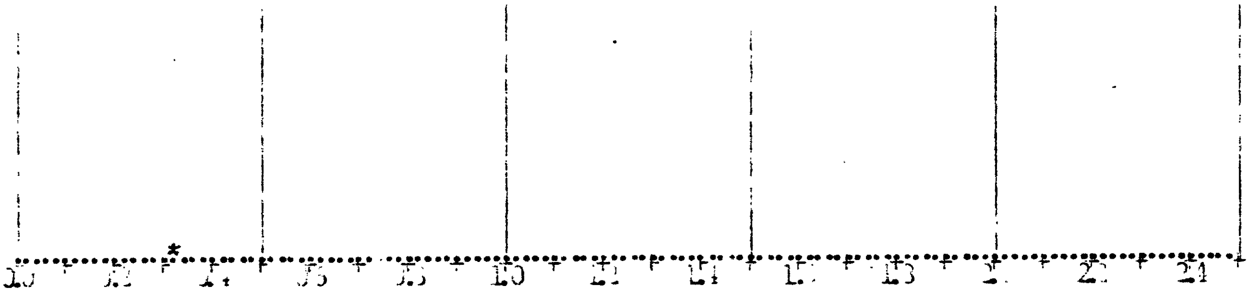
31

2 of 2

C

Poor slide, with a bare minimum of [illegible] readings. The singular piece appears to be representative of the whole slide even though no other readings were taken. The reading was taken on a grain of vitrinite, certainly.

```
******************] ORDERED REFLECTANCE VALUES [*****************
0.33
Minimum    0.33                                  St Dev.    0.00
 Midrange   0.33         Mean        0.33        Variance   0.00
 Maximum    0.33         Median      0.33        Range      0.00
Class W.   0.02
```



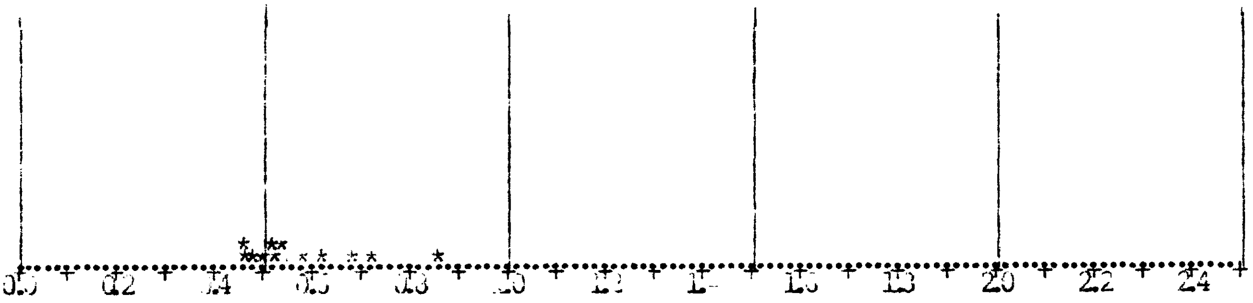
```
Pick: .35 Alt. Pop. [illegible] to [illegible]

D. S. I. DP           Project: Gautier
                Other ID. 11-31 **CO-84-58V  Mean Depth:     0.00  meters
Well or section:              0.00 feet
Sample type: [illegible] ,  Prep: Cid mac.
Date: 27 [illegible] 84  Finished [illegible]  Analyst:    MJP
Standard used: Sa-15,  Standard change at end:
```

76

(32) (Skull Cr. Sh) Owl G. Canyon 1 of 3

SWSW 5 T9N - R69W

```
Fair slide.  Organics are fairly consistent in rank  Material is certainly
vitrinite.

******************] ORDERED REFLECTANCE VALUES [*****************
 0.47 0.[illegible]7 0.48 0.5[illegible] 0.52 0.52 0.54 0.55 0.59 0.62 0.6[illegible] 0.72 0.88
 Minimum    0.47          N              13         Std.Dev.     0.11
Midrange    0.63          Mean         0.58         Variance     0.01
Maximum     0.8[illegible]          Median       0 54         Range        0.4[illegible]
Class Int.   .02
```

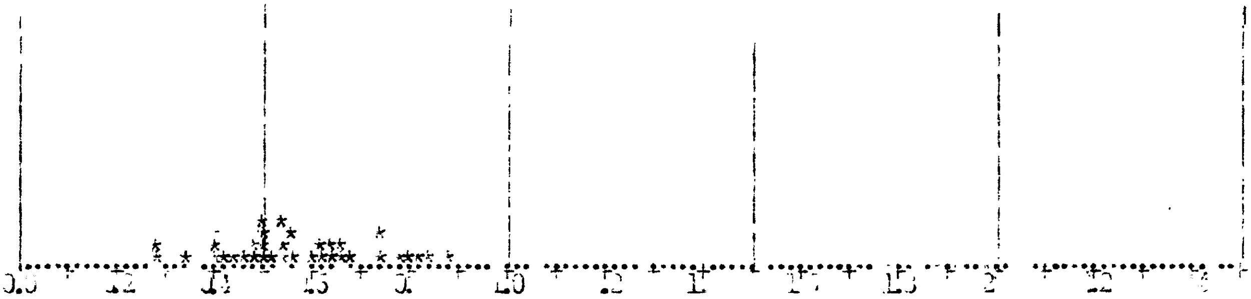


```
Pick  .50 Alt. Prob. LS  to  PASLV+bga+


U.S.G.S. OF-          Project: Gautier
                  Other No. 11-28**CO-84-53V  Mean depth:      0.00 meters
 Well or section:              0.00 feet
Sample Type:  /C.  ,    Prep: acid mac.
Date: 27X184  Time:  to   Analyst:    JP
Standard used: Sa-16.  Standard change at end:
```

32

2 of 3

```
Sparse.

  ***                                             v
 .2   .   .4 0.    0.41 0   0.44 0.47  43 0.     0  0.51         5 0.5     5
 .56  7 0.                                   .56 0. 6  .5  0 74      7  0 .8 0.   . 3 0       0.
Min
    a        5                     .57            var
 la                                a   0.55       nge         0
```



```
Pi    .50  t. Pro                                       +

                       ect  Gautier
               ter   o. 11-26**CO-84-54V
       ection
                   :                 acid     .
   e:            me
```

78

313

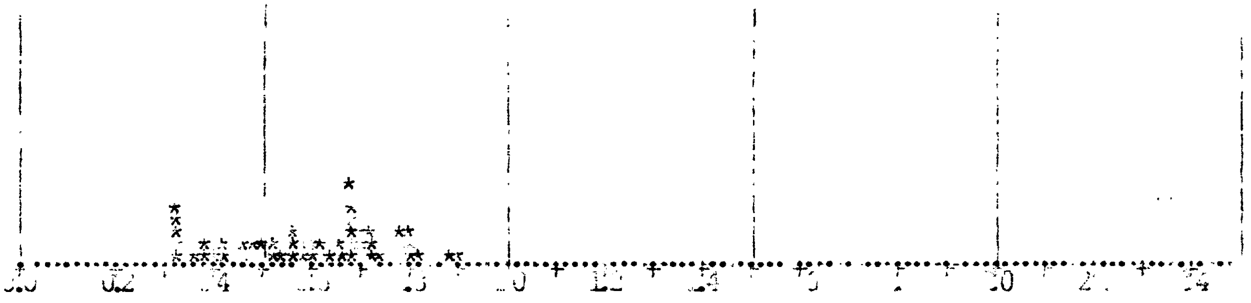
(32) Owl Cr. Canyon

[illegible] Org [illegible]

[illegible] about [illegible] organic [illegible] sample. There are [illegible]

[illegible]

```
******* ******** [illegible] N [illegible] **********
[illegible] 0.3 [illegible] .4 [illegible] 0.80 [illegible] 0.51 [illegible] 0.5 0. [illegible]
[illegible] 0.66 [illegible] .69 .69 [illegible]
[illegible] 0.71 0.2 [illegible] 0.7 [illegible] 0.73 [illegible] 0.83 [illegible]
[illegible]          N           25             [illegible]      0 [illegible]
[illegible]          Mean        0.60           Variance [illegible]
[illegible]          Median      0.62                            0 [illegible]
```



[illegible] .4 [illegible] +

```
[illegible] Project: Gautier [illegible]
           [illegible] No. 11-32**CO-84-55V [illegible] 0. [illegible] eters
[illegible] section: [illegible] .0 [illegible]
[illegible]: O/C. , [illegible]: acid mac.
[illegible] 11/ [illegible] /84 [illegible] to [illegible]
S[illegible] -16. [illegible]
```

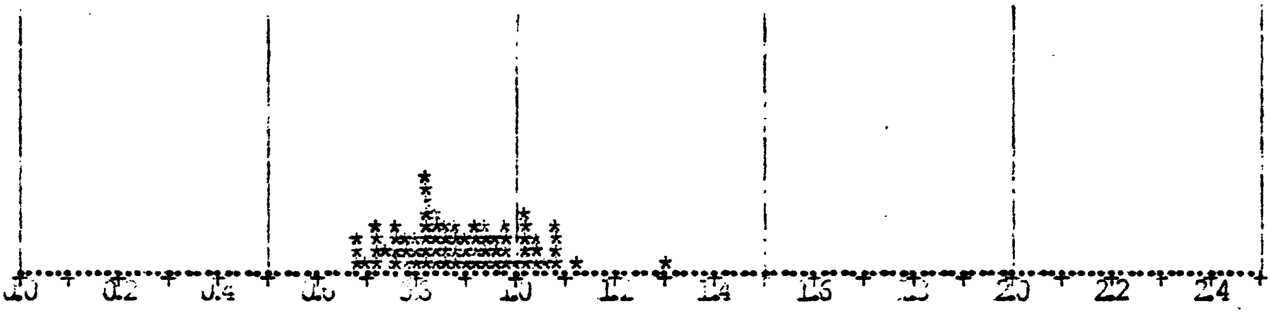
③③ MCAR 1 of 1

0.85 Ro Pick S-Platte Fm.

T1S R71W S1/2 SENE

Good slide. Organics are very consistent. All terriginous material. Easy selection of vitrinite.

```
******************| ORDERED REFLECTANCE VALUES [******************
 0.68 0.68 0.69 0.70 0.72 0.72 0.73 0.73 0.74 0.75 0.76 0.76 0.76 0.77 0.78 0.78 0.79 0.80 0.80 0.80
 0.82 0.82 0.82 0.83 0.83 0.83 0.83 0.83 0.84 0.84 0.85 0.85 0.85 0.86 0.86 0.87 0.87 0.88 0.88 0.88
 0.89 0.90 0.[illegible] 0.91 0.92 0.92 0.93 0.93 0.94 0.95 0.95 0.95 0.95 0.95 0.97 0.9[illegible] 0.98 0.99 0.99 1.01
 1.02 1.02 1.[illegible] 1.03 1.03 1.05 1.05 1.05 1.07 1.08 1.08 1.09 1.09 1.13 1.32
Minimum     0.68          N              7[illegible]       Std.Dev.     0.12
Midrange    1.00          Mean        0.89       Variance     0.02
Maximum     1 32          Median      0.88       Range        0.64
 Last R.    0.[illegible]2
```



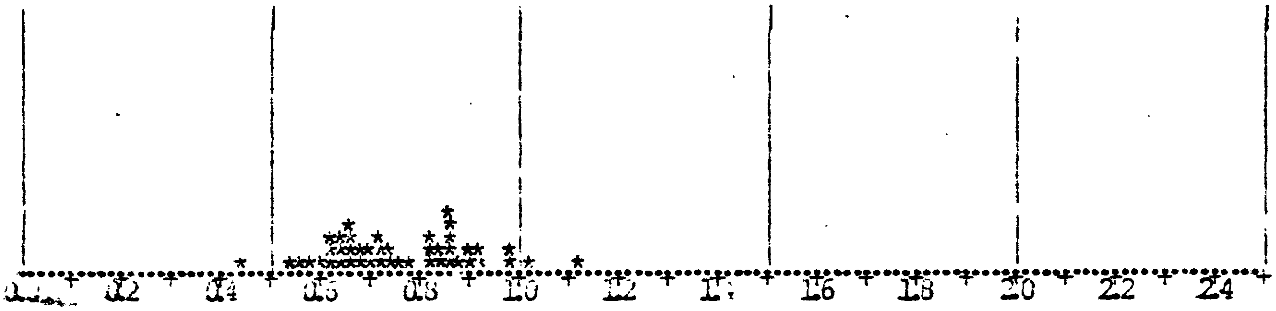
```
Pick: .85 Alt. Prob. LG  to  PASLv÷pgn=+


U.S.G.S. OP-        Project: Gauiter
               Other No. 11-12//CO-84-14  Mean depth:     0 0[illegible] meters
Well or section  J sandstone             0.0 feet
Sample type: O/C,  ,  Prep: acid mac.
Date: 2/III84  Time:  to E  Analyst:   MJP
Standard used: Sa-16   Standard change at end:
```

80

(34) Plainview SKUPP Ca 1/2

T2S-R71W-12 0.58 pick (both slides considered)

```
Good slide.  Organics are abundant, though the vast majority of material i
s  higher than the the organics on which most of the Ro readings were taken.
Good vitrinite, some structtured.

******************] ORDERED REFLECTANCE VALUES [*****************
 0.44 0.55 0.56 0 58 0.61 0 62 0.63 0 63 0.64 0.65 0.65 0.65 0.66 0.67 0.6  0.68 0.69 0.7  0.70 0 72
 0.73 0.73 0 74 0.75 0 77 0.78 0.82 0.82 0.83 0 84 0 84 0.86 0.87 0.8  0.87 0.87 0.89 0.90 0.91 0.92
 0.93 0 93 0.99 1 03 1.14
Minimum     0.44          N              45          Std.Dev.      0 14
Mi range    0.79          Mean         0 76          Variance      0.02
Maximum     1 14          Median       0 74          Range         0 70
Class w.    0 02
```



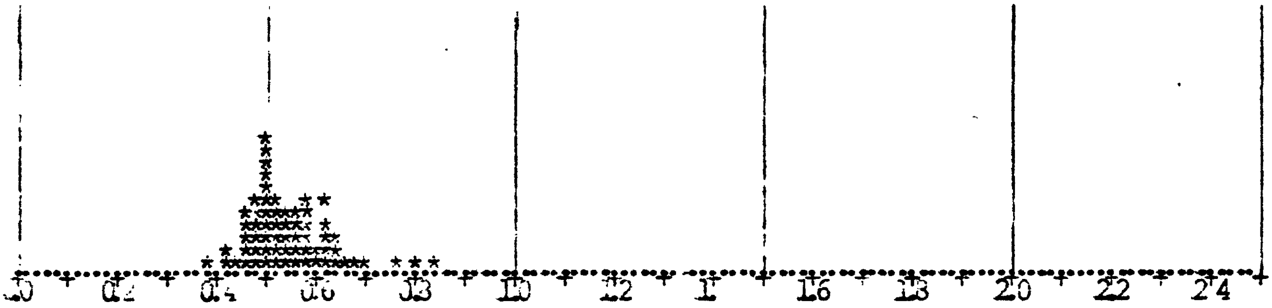
```
Pick  .65 Alt. Prob. LS  to  P.SLV+

U.S.G.S  OP-          Project: Gautier
                   ther No. 11-9//CO-84-11  Mean depth:      0 00 meters
Well or section: J sandstone             0.00 feet
Sample Type: O/C,   ,  Prep: acid mac.
Dat : 2VIII84  Time:  to   Analyst:   MP
Standard used: Sa-16,  Standard change at end:
```

81

(34) Plainview

2 of 2

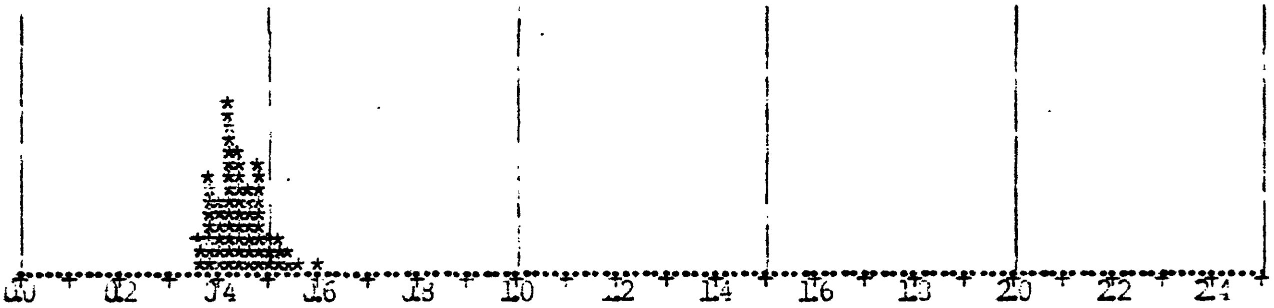
```
Pretty good slide.  Consistnet organics, structured and un.

******************* ORDERED REFLECTANCE VALUES [*****************
 0.39 0.42 0.43 0.45 0.45 0.45 0.45 0.47 0.47 0.48 0.48 0.48 0.48 0.49 0.49 0.50 0.50 0.50 0.50 0.50
 0.51 0.51 0.51 0.51 0.51 0.51 0.52 0.52 0.52 0.52 0.52 0.53 0.54 0.54 0.54 0.54 0.55 0.55 0.56 0.56
 0.57 0.57 0.58 0.58 0.58 0.58 0.58 0.59 0.60 0.60 0.62 0.62 0.63 0.63 0.63 0.6  0.64 0.64 0.64 0.67
 0.68 0.70 0.76 0.80 0.86
Minimum      0.39                      65            Std.Dev.     0.09
Midrange     0.63          Mean        0.55          Variance     0.01
Maximum      0.86          Median      0.54          Range        0.47
Class  .     0.02
```



```
Pick: .51 Alt. Prob. L   to  PASLV+pgh=+

 U.S.G.S. OP-         Project: Gautier
                   Other No. 11-11//CO-84-12  Mean depth       0.00 meters
 Well or section: J Sandstone                0.00 feet
Sample Type: O/C,  ,  Prep  acid mac.
Date  2VIII84  File:  to   Analyst:   MJP
Standard  used: Ga-16   Standard change at end
```

(35) I-70 Roadcut
4s - 70w -14
0.40 pick '92

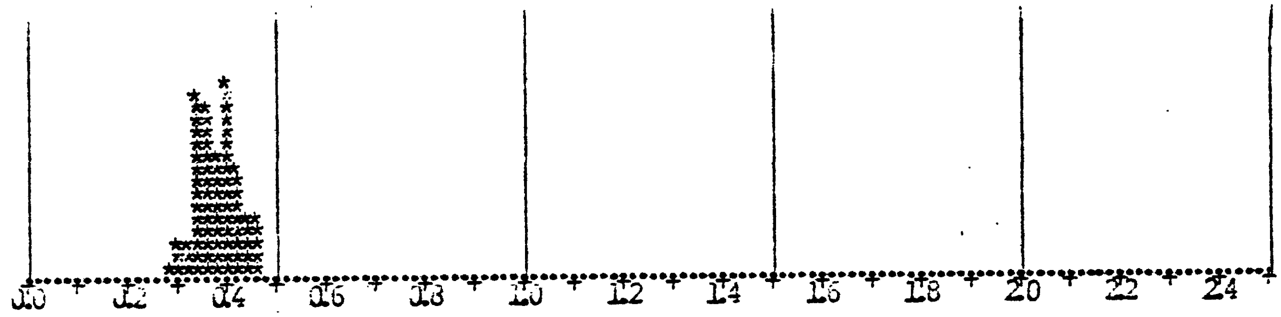
```
Good sample.  Vitrinite is common and decidedly consistent and evident.

******************] ORDERED REFLECTANCE VALUES [******************
 0.36 0.36 0.37 0.38 0.38 0.38 0.39 0.39 0.39 0.39 0.39 0.40 0.40 0.41 0.41 0.41 0.41 0.42 0.42 0.42
 0.42 0.42 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.44 0.44 0.44 0.44 0.44 0.44 0.45 0.45 0.45
 0.45 0.4  0.46 0.46 0.47 0.47 0.47 0.47 0.48 0.48 0.48 0.48 0.4  0.48 0.49 0.4  0.49 0.50 0.50 0.51
 0. 2 0.52 0.52 0.54 0.55 0.56 0.61
Minimum      0.36           N                67         Std.Dev.      0. 5
Midrange     0 49           Mean           0.45         Variance      0.00
Maximum      0 6            Median         0.44         Range         0.25
Class W.      .02
```



```
Pick: .44 Alt. Prob. L    to   PA LV+pgn=+


U.S.G. . OP-         Proje t: Gautier
                 Other No. 11-13//CO-84-7   ean depth:       0.00 meters
Well or section: J Sandstone               0.00 feet
Sample Type: O/C    ,  Prep   cid  
Date: 2   184  Time:  to   Analyst:   MJP
Standard used  Ga-16    tandard change at end: .0
```

(35) I-70 Roadcut 292

```
Good sample.   Good structured vitrinite.  Easy selection for Ro readings.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.29 0.30 0.30 0.31 0.32 0.32 0.33 0.34 0.34 0.34 0.34 0.34 0.35 0.35 0.35 0.35 0.35 0.35 0.35 0.35
 0.35 0.35 0.36 0.36 0.36 0.36 0.36 0.36 0.36 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.38 0.38 0.38 0.38
 0.38 0.38 0.38 0.39 0.39 0.39 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.41 0.41 0.41
 0.41 0.41 0.42 0.42 0.42 0.42 0.42 0.42 0.43 0.43 0.43 0.44 0.44 0.44 0.44 0.45 0.46 0.46 0.46 0.46
 0.47
Minimum     0.29          N             81         Std.Dev.      0.04
Midrange    0.38          Mean        0.38         Variance      0.00
Maximum     0.47          Median      0.38         Range         0.18
Class w.    0.02
```



```
Pick· .38  Alt. Prob. LG  to  PASLV+ ̄gh=+


U.S.G.S. OP-         Project: Gautier
               Other No. 11-10//CO-84-8  Mean depth:      0.00 meters
Well or section: J sandstone              0.00 feet
Sample Type: O/C,  ,  Prep: acid mac.
Date: 2VIII84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end:
```

(36) 4s-70w-14

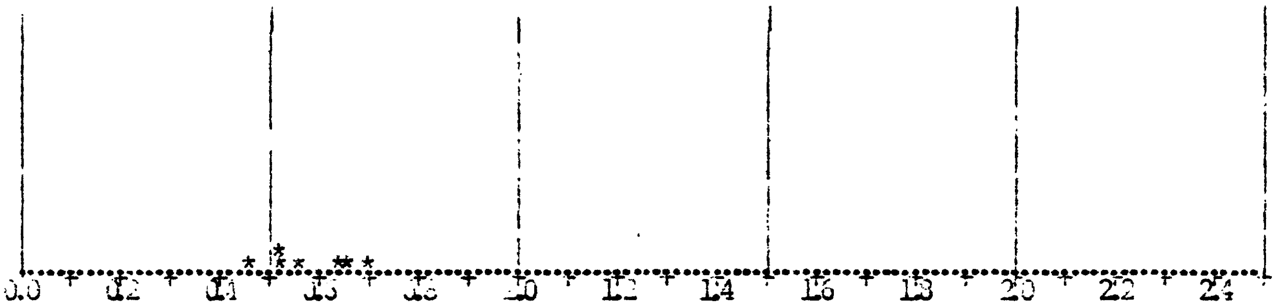
Morrison

1of2

0.50 pick

Interesting slide. Almost all the material is fusinite, next to no vitrinite
A few pieces, good material but showing somewhat scattered Ro readings.

```
******************] ORDERED REFLECTANCE VALUES [******************
 0.47 0.52 0.53 0 56 0.65 0.6[illegible] 0.73
Minimum      0.47         N              7       Std.Dev.      0.08
Midrange     0.60         Mean        0.59       Variance      0.01
Maximum      0.73         Median      0.56       Range         0.26
Class W.     0.02
```



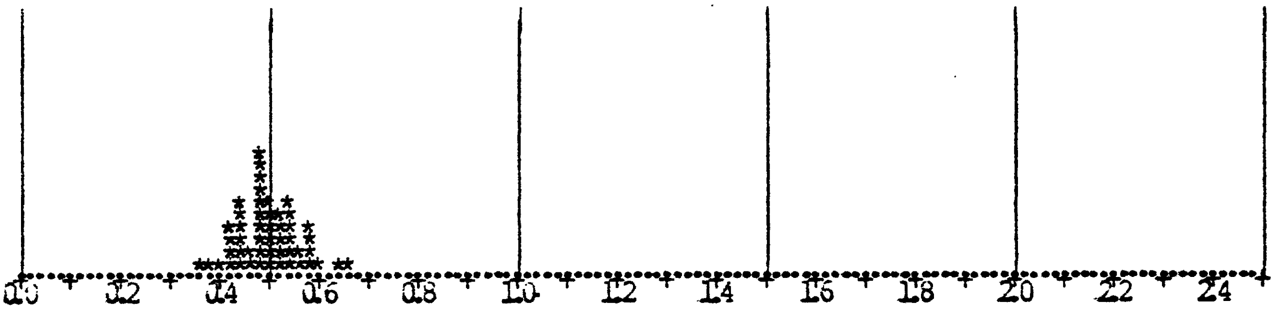
```
Pick: .53 Alt. Prob. LS  to  PASLV.pgn=+

U.S.G.S. OP-         Project: Gautier
                    Other No. 11-5**[illegible]-84-5  Mean depth:      0.00 meters
Well or section:                 0 00 feet
Sample Type: O/C,  ,  Prep: whl.rk.
Date: 24VII84  Time:  to   Analyst:   [illegible]
Standard used: Sa-16,  Standard change at end: .00
```

36 Morrison

2 of 2

Good slide. Organics are common, some with structure and certainly terrigenous material. Some weathering evident.

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.36 0.39 0.40 0.42 0.42 0.42 0.43 0.44 0.45 0.45 0.45 0.45 0.45 0.46 0.46 0.48 0.48 0.48 0.48 0.48
 0.48 0.49 0.49 0.49 0.49 0.50 0.50 0.50 0.50 0.51 0.51 0.52 0.52 0.52 0.52 0.53 0.54 0.54 0.54 0.55
 0.55 0.55 0.56 0.57 0.58 0.58 0.59 0.59 0.61 0.64 0.68
Minimum      0.36          N                51          Std.Dev.      0.06
Midrange     0.52          Mean           0.50          Variance      0.00
Maximum      0.68          Median         0.50          Range         0.32
Class W.     0.02
```



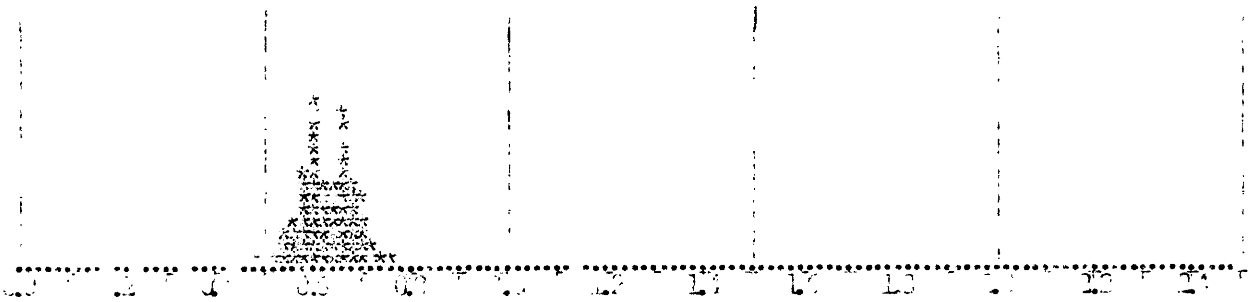
```
Pick: .50 Alt. Prob. LG  to  PASLV+pgn=+

U.S.G.S. OP-        Project: Gautier
                Other No. 11-14//CO-84-6  Mean depth:      0.00 meters
Well or section: J sandstone              0.00 feet
Sample Type: O/C,   ,  Prep: acid mac.
Date: 6VIII84  Time:  to   Analyst:    MJP
Standard used: Sa-16,  Standard change at end:
```

(37) T6S-R69W-31

1 of 2

(59 poor sample - fusinite)

```
[illegible] sample. [illegible] is scrapings from an outcrop sample. All the material
is certainly vitrinite. [illegible]ate consist[illegible]t.

*****************] ORDERED REFLECT[illegible] VALUES [*****************
 0.49 0.53 0.54 0.54 0.55 0.57 0.57 0.57 0.57 0.58 0.58 0.58 0.5  0.59 0.59 0.59 0.59 0.60 0.60 0.60
 0.60 0.60 0.60 0.60 0.61 0.61 0.61 0.61 0.61 0.61 0.61 0.62 0.62 0.63 0.63 0.63 0.63 0.63 0.64 0.64
 0.65 0.65 0.65 0.65 0.65 0.66 0.66 0.66 0.66 0.66 0.66 0.67 0.67 0.67 0.67 0.67 0.67 0.67 0.68 0.68
 0.68 0.69 0.69 0.69 0.69 0.70 0.70 0.70 0.70 0.71 0.71 0.72 0.73 0.75 0.76
Minimum     0.49                         75              Std. Dev.     0.05
Average     0.63          Mean        0.64              Variance      0.00
Maximum     0.76          Median      0.63              Range         0.27
Class  .    0.05
```

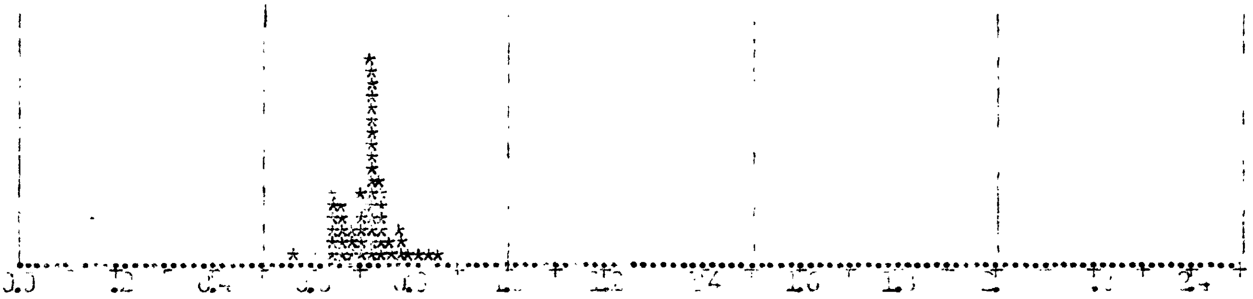


```
Pick  .54 [illegible] . Prob. [illegible] HVBV+ [illegible]


U.S.G.S. [illegible]          Project: Gautier
                    Order No. 26-2--CO-84-60   Mean depth:        0.00 meters
  [illegible] or section:              0.0 feet
Sample type: [illegible]          Scrapings
Date: 2 [illegible]4   Time:  [illegible]    Analyst: [illegible]
Standard used  [illegible]-16     Standard change at end:
```

87

37

```
******************  [illegible]  ******************
 .57  .60 0.  0.6  0.65 0.65 0.65 0.65 0.67 0.67 0.67 0.67 0.68 0.69  .69  .70 0.70 0.70 0.70
 0.71 0.71 0.72 0.72 0.72 0.72 0.72 0.72 0.72 0.72 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.74
 0.74 [illegible] 0.74 0.74 0.75 0.75  .75 0.77 0.78  .79 0.79 0. [illegible] 0.85 0.85
Minimum     0.57            #                           Std.Dev       0.05
Midrange    0.72            Mean        0.72            Variance      0 00
Maximum      .86            Median      0.72            Range         0 29
Class  .    0 02
```



```
ist  .72 [illegible] Prob [illegible] to [illegible]

 [illegible] OP-        Project:  Gautier
                    Order No. 26-3**CO-84-61   Mean Depth:       0.00 meters
 Len. of section:             0.00 feet
 Sample Type:    ,  ,  Prep: acid mac.
 [illegible] Time to  analyse:  1T?
 [illegible] used: Ga-16   Standard change at end
```

61 + 60
Outcrop

88

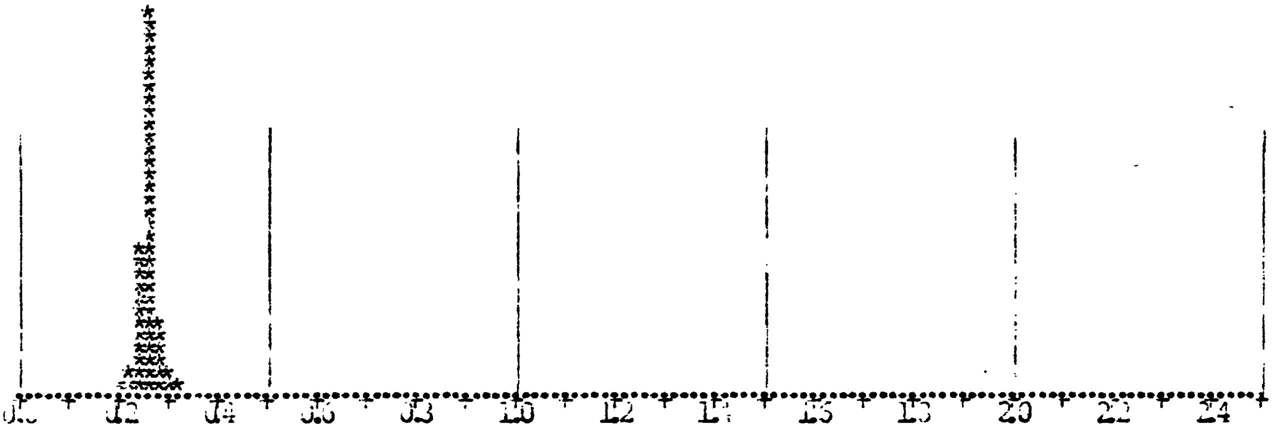
TURKEY CREEK

T614

38
5S-70W-12

0,35 pick
for LOCATION

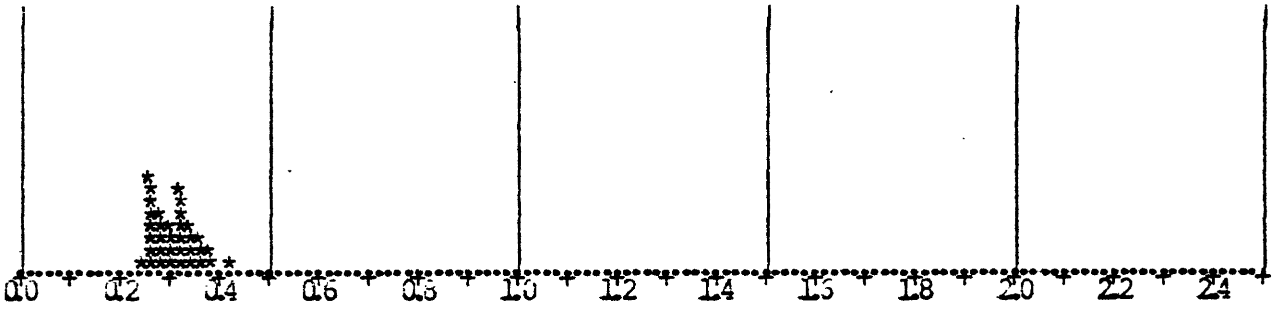
```
Good slide.   Coal sample.  Excellent strucyure on the coaly pieces   ER

******************] ORDERED REFLECTANCE VALUES [*****************
 0.21 0.22 0.23 0.24 0.24 0.24 0.24 0.24 0.24 0.25 0.25 0.25 0.25 0.25 0.25 0.26 0.26 0.26 0.26 0.26
 0.26 0.26 0.26 0.26 0.26 0.26 0.26 0.26 0.26 0.26 0.27 0.27 0.27 0.27 0.27 0.27 0.27 0.27 0.27 0.27
 0.27 0.27 0.27 0.27 0.27 0.27 0.28 0.28 0.28 0.28 0.29 0.29 0.30 0.31 0.33
Minimum      0.21          N               55          Std.Dev.      0.02
Midrange     0.27          Mean          0.26          Variance      0.00
Maximum      0.33          Median        0.26          Range         0.12
Class W.     0.02
```



```
Pick: .26 Alt. Prob. LG  to  PASLV+pgn=+


U.S.G.S  OP-         Project: Gautier
               Other No. 11-3**CO 84-1  Mean depth:      0.00 meters
Well or section:            0.00 feet
Sample Type: O/C,  ,  Prep: whl. rk.
Date: 24VII84  Time:  to    Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

38 Turkey Cr 2174

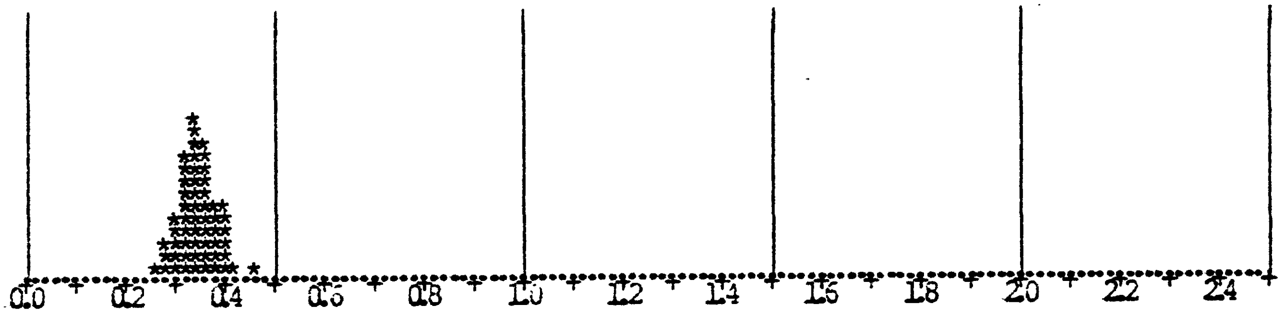
```
Good slide.  Organics are consistently alike.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.25 0.26 0.25 0.25 0.26 0.26 0.26 0.27 0.27 0.28 0.29 0.29 0.29 0.29 0.30 0.30 0.31 0.31 0.32 0.32
 0.32 0.33 0.33 0.33 0.33 0.34 0.34 0.35 0.35 0.36 0.37 0.37 0.38 0.38 0.45
Minimum     0.25          N             35        Std.Dev.     0.04
Midrange    0.35          Mean        0.31        Variance     0.00
Maximum     0.45          Median      0.31        Range        0.20
Class W.    0.02
```



```
Pick: .31 Alt. Prob. LG  to  PASLV+pgh=+

U.S.G.S. OP-        Project: Gautier
               Other No. 11-8**CO-84-2  Mean depth:     0.00 meters
Well or section: J sandstone          0.00 feet
Sample Type: O/C,  ,  Prep: accid mac.
Date: 6VIII84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

38 Turkey Cr 344

```
*****************] ORDERED REFLECTANCE VALUES [*****************
 0.27 0.28 0.29 0.29 0.30 0.30 0.31 0.31 0.31 0.32 0.32 0.32 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.34
 0.34 0.34 0.35 0.35 0.35 0.35 0.35 0.35 0.35 0.35 0.35 0.35 0.36 0.36 0.36 0.36 0.37 0.37 0.37 0.37
 0.37 0.37 0.37 0.38 0.38 0.38 0.38 0.39 0.39 0.40 0.40 0.41 0.41 0.41 0.41 0.43 0.48
Minimum     0.27           N              57          Std.Dev.     0.04
Midrange    0.38           Mean         0.35          Variance     0.00
Maximum     0.48           Median       0.35          Range        0.21
Class W.    0.02
```

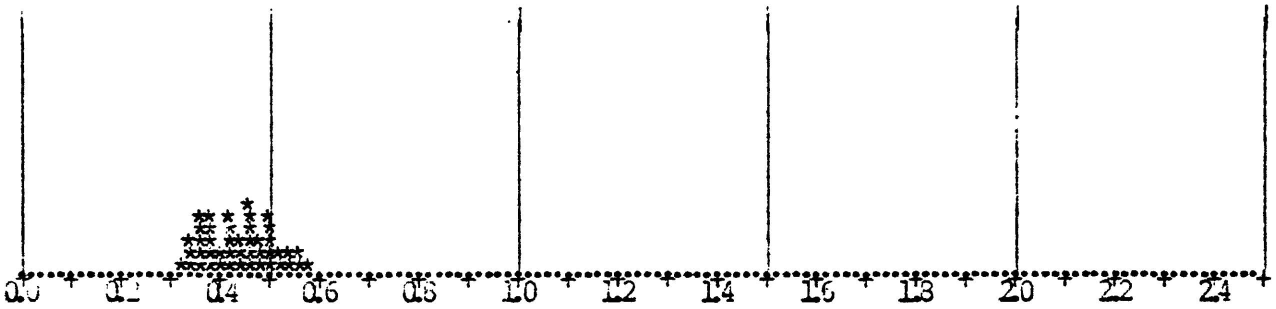


```
Pick: .35 Alt. Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-        Project: Gautier
               Other No. 11-7[illegible]**CO-84-3  Mean depth:     0.00 meters
Well or section: J Sandstone             0.00 feet
Sample Type: O/C,  ,  Prep: acid mac.
Date: 6VIII84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .00
```

38 Turkey Cr

414

```
Fair slide.  Organics are not so abundant.  Some good structured vitrinite.
  fair bit of recycled material, also.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.33 0.34 0.35 0.35 0.36 0.36 0.37 0.37 0.37 0.38 0.38 0.38 0.38 0.39 0.40 0.40 0.42 0.42 0.42 0.42
 0.43 0.44 0.44 0.45 0.46 0.46 0.46 0.47 0.47 0.47 0.48 0.49 0.49 0.50 0.50 0.51 0.51 0.51 0.52 0.53
 0.54 0.55 0.56 0.56 0.61
Minimum      0.33          N              45          Std.Dev.      0.07
Midrange     0.47          Mean         0.44          Variance      0.00
Maximum      0.61          Median       0.44          Range         0.28
Class W.     0.02
```



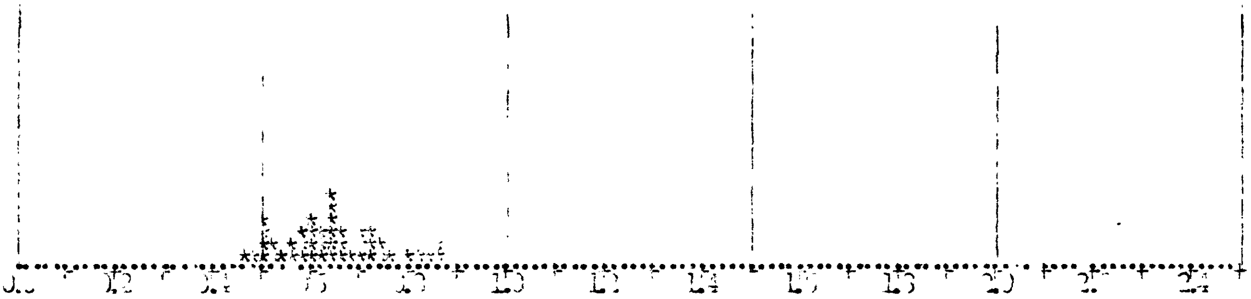
```
Pick: .44 Alt. Prob. LG  to  PASLV+pgh=+


U.S.G.S. OP-        Project: Gautier
                 Other No. 11-6//CO-84-4  Mean depth:      0.00 meters
Well or section: J Sandstone            0.00 feet
Sample Type: O/C,  ,  Prep: acid mac.
Date: 2VIII84  Time   to   Analyst:   MJP
Standard used: Sa-13   Standard change at end: .00
```

16(1)

(39) T6S - R69W - 4

Ox. Gy SH.

```
******************] ORDERED REF  LC  ICE V  ES [*****************
 0.47 0.49 0.50 0.50 0.51 0.51 0.53 0.53 0.5  0.55 0.55 0.57 0.58 0.59 0.59 0.6  .61 0.61 0.63 0.63
 0.6  0.6  0.64 0.64 0.64 0.65 0.65 0.66 0.67 0.67 .6  0.71 0.71 0.71 0.72 0.7  0.73 0.74 0.75 0.76
 0.80 0.8  0.84 0.85 0.87
 Minimum      .47          N              45           St. Dev.       0.10
  eometric e  0.67         Mean         0.65           Variance       0.01
 Maximum      .87          Median       0.            Range          0.40
 C  ss   .    . 2
```



```
 Peak  Fit.  rom.     to  P  G/+ng =
```

.64

```
U.S.G.S. OF-          Project: Ga tier
                 Other No. 26-6**CO-84-64   Meas. Depth:      0.0  meters
 ell or section:                .0  Feet
S mple  nit: )C  ,  Gren  acid react.
S ee  11 IF5  Pi  .  to   Analyst:   'J'
  an   used   a 1     standard  ca  ra e   n d
```

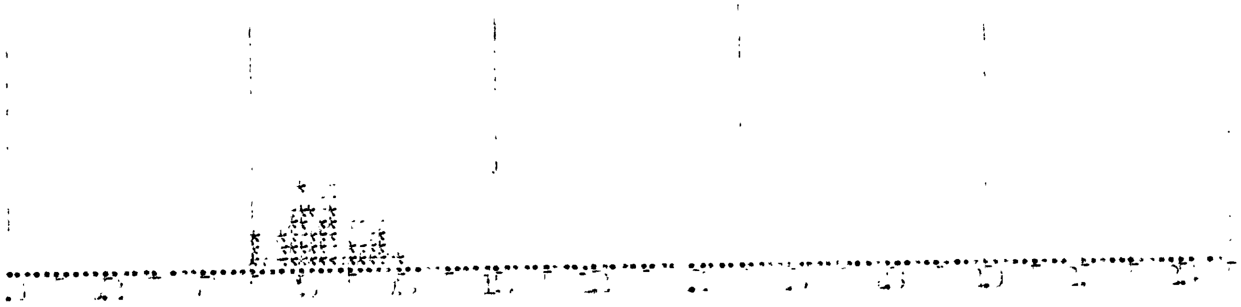
Outcrop

S of Turkey Cr.

1 of 2

(40) T 7S-R 69 W- S. 12 .72 pick

```
[illegible]
[illegible]

******************* [illegible] *******************
[illegible] 0.77 0.77 0.57 [illegible] 0.51 .51 0.51 .51 [illegible]
[illegible] 0.54 .55 0.55 [illegible] 0.57 .5 [illegible] 0.71 [illegible]
0.71 .71 0.72 [illegible] 0.72 [illegible] 0.74 0.74 [illegible] 0.75 0.7 0.7 0.77 0.7 [illegible]
[illegible]                                    5 [illegible]         Std. Dev.      [illegible] 07
[illegible]        0.65        [illegible]          [illegible]      Variance       [illegible]
[illegible]        0.          [illegible]          6                Range          0.38
[illegible]        0.
```



```
[illegible] Nat. Prob. [illegible] +

[illegible] Print out: [illegible]
        Station No. 26-4***CO-84-62 [illegible] meters
[illegible] Section [illegible]
Sample type: [illegible] Prep [illegible]
[illegible] Anal st [illegible]
Standard used: [illegible] -15, Standard change at end
```

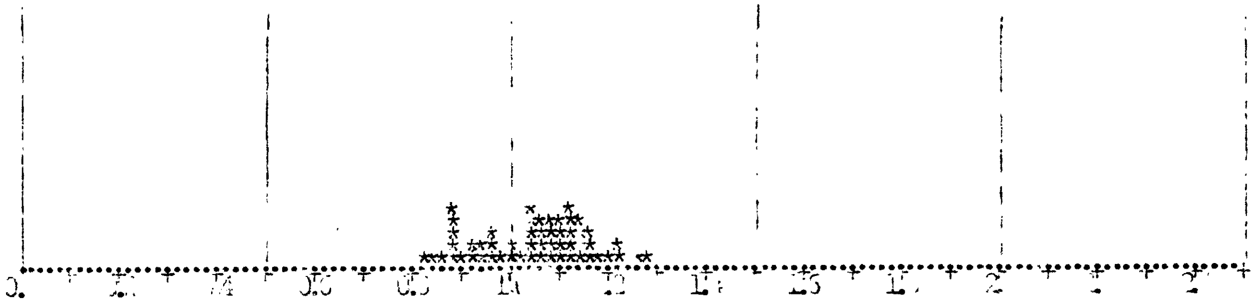
62 + 63
Outcrop

94

2 of 2

40

```
******************ORDERED REFLECTANCE VALUES*****************
0.83 0.85 0.87 0.88 0.88 0.[illegible] 0.89 [illegible] 0.91 0.93 0.93 0.94 0.94 0.9[illegible] 0.95 0.9[illegible] 0.9[illegible] 1.00 1.01 1.02
1.04 1.04 1.0[illegible] 1.05 1.05 1.05 1.06 1.0[illegible] 1.07 1.08 1.0[illegible] 1.09 1.10 1.11 1.1[illegible] 1.11 1.11 1.12 1.12
1.13 1.13 1.14 1.14 1.1[illegible] 1.15 1.17 1.17 1.17 1.[illegible]3 1.2[illegible] 1.2[illegible] 1.23 1.25 1.30
Minimum      0.83          N                55          Std.Dev.       0.[illegible]1
I range      [illegible]          Mean           [illegible].05          Variance       0.01
Maximum      1.3[illegible]          Median          1.07          Range          0.4[illegible]
Class I.     0.02
```



```
Pick  1.0  Alt. Pos. L  [illegible]  RSV:phase+
```

```
U.S.G.S. OP-          Project:  Gautier
                  Owner No. 26-5**CO-84-63   Mean depth:          [illegible]00 meters
Int. of section:                0 00 feet
Sample type: [illegible]  [illegible] acid mac.
Date analyzed: [illegible]   Analyst:  [illegible]
Standard used: Ga-1[illegible]  Scan error change at end
```

62 & 63

95

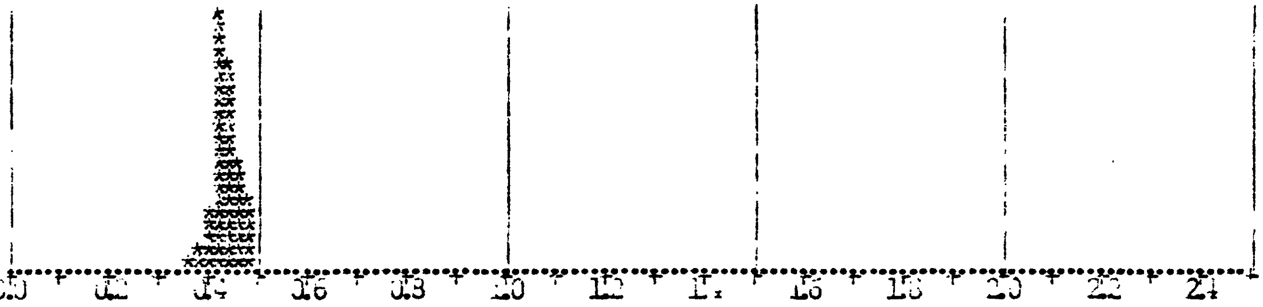
Highway 128

0.44 Pick

T.1S. - R70W Laramie-Fox Hills Fms. 191

SE 34

```
Outcrop sample of coal.  Heavily weathered.  Good Ro readings.

******************] ORDERED REFLECTANCE VALUES [******************
 0.37 0.38 0.39 0.40 0.40 0.40 0.41 0.41 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.43 0.43 0.43
 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.44 0.44 0.44 0.44 0.44 0.44 0.44 0.44 0.44 0.45 0.45
 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.46 0.46 0.46 0.46 0.46 0.46 0.47 0.48 0.48 0.48 0.49 0.49
 0.49
Minimum      0.37           N               61          Std. Dev.      0.03
Midrange     0.43            Mean         0.44          Variance       0.00
Maximum      0.49           Median        0.44          Range          0.12
Class W.     0.02
```

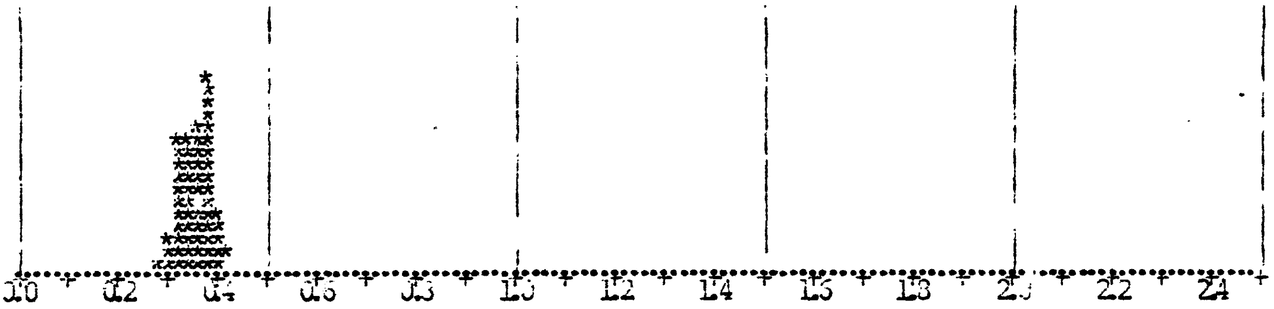


```
Pick: .44 Alt. Prob. LG  to  ASLV rgn=+


U.S.G.S. DP           Project: Gautier
                  Other No. 11-1**CO-84-13   Mean Depth:       0.00 meters
Well or section:                  0.00 feet
Sample type: O/C,  ,  Prep: wh. rk.
Date: 24VII84  Time:  to  Analyst:   MJP
Standard used: Sa-16,  Standard change at end  .00
```

Leyden Road 1/2

~~0.35 0.45 pick~~ 0.38 pick T2s-R70W
Laramie Fm SESE 28

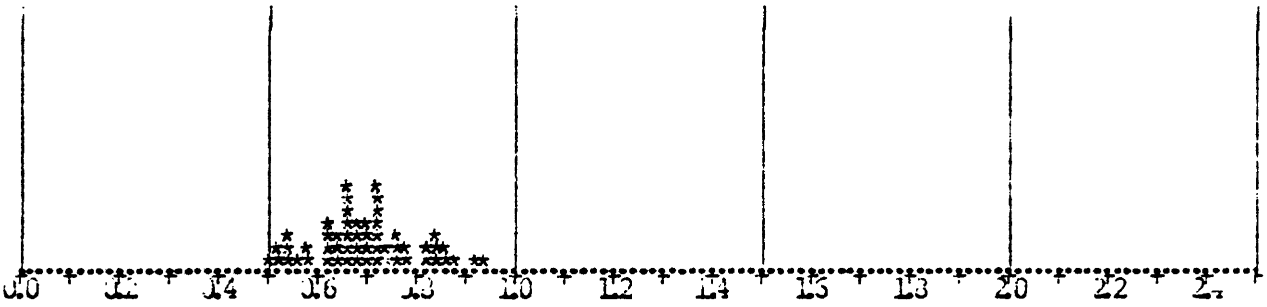
```
Coal sample, heavily weathered.  Good vitrinite, though.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.28 0.31 0.31 0.31 0.32 0.32 0.32 0.32 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.34 0.34 0.34 0.34 0.35
 0.35 0.35 0.35 0.35 0.35 0.35 0.36 0.36 0.36 0.36 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.38 0.38
 0.38 0.38 0.38 0.38 0.39 0.39 0.39 0.39 0.39 0.39 0.39 0.39 0.39 0.39 0.40 0.40 0.40 0.40 0.41 0.43
 0.43
Minimum     0.28          N              61          Std.Dev.     0.03
Midrange    0.36          Mean         0.36          Variance     0.00
Maximum     0.43          Median       0.37          Range        0.15
Class  .    0.02
```



```
Pick: .36 Alt. Prob. [illegible]  to  PASLV+[illegible]gn=+


U.S.G.S. DP-         Project: Gautier
               Other No. 11-2**CO 84-9  Mean Depth:      0.00 meters
Well or section:              0.00 fee
Sample Type: O/C    ,  Prep: whl.rk.
Date  24VII84  Time:  to   Analyst:   MJP
Standard used: Sa-16,  Standard change at end: .0
```

Leyden Road 2/2
T2S - R70W
SESE 28

```
Outcrop sample.  Sample is a coal, heavily weathered, but with good vitrinite.
Ro readings apparantly not affected by the weathereng.

*****************] ORDERED REFLECTANCE VALUES [*****************
 0.51 0.52 0.53 0.54 0.54 0.55 0.55 0.58 0.59 0.62 0.62 0.63 0.63 0.64 0.64 0.64 0.65 0.65 0.65 0.66
 0.66 0.67 0.67 0.68 0.68 0.69 0.69 0.70 0.70 0.71 0.71 0.72 0.72 0.72 0.73 0.73 0.73 0.73 0.74 0.75
 0.75 0.77 0.77 0.79 0.79 0.83 0.83 0.84 0.85 0.85 0.86 0.87 0.88 0.94 0.94
Minimum     0.51          N              55        Std.Dev.     0.10
Midrange    0.73          Mean         0.70        Variance     0.01
Maximum     0.94          Median       0.70        Range        0.43
Class W.    0.02
```



```
Pick: .55 Alt. Prob. LS  to  PASLV+pga=+

U.S.G.S. OP-        Project: Gaucleer
                 Other No. 11-4**0-84-10   Mean depth      0.00 meters
Well or section:                 0.00 feet
Sample type: O/C,  ,  Prep: Wh. rk.
Date: 21VII83  Time:  to  Analyst:   MJP
Standard used: Sa-15,  Standard change at end: .00
```