SOIL CHARACTERISTICS OF THE LITHOLOGIC UNITS OF WAKE COUNTY

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Introduction

The purpose of this project is to determine the extent to which soil analyses carried out by the North Carolina State Highway Department in their construction subsurface investigations can be correlated with the lithologic units of Wake County. This has been done with a view toward identifying major differences in the soils developed on the different lithologic units. The soil characteristics observed are plastic limit, liquid limit, plasticity index, activity and grain size gradation. The plastic limit is the lowest amount of water in weight percent at which a soil remains plastic as determined by the standard plastic limit test. [1] The liquid limit is the water content in weight percent at which a soil passes from a plastic to a liquid state as determined by the standard liquid limit test. [2] The plasticity index, which is an indication of the range of moistures over which a soil behaves plastically, is the numerical difference between the plastic limit and the liquid limit. The activity is an indication of the amount of active clay minerals in a soil. It is determined by dividing the plasticity index by the fraction of particles in the sample smaller than 0.005 (clay). The grain size gradation is divided into five size groupings. Those are coarse aggregate, particles larger than 2.0 mm; coarse sand, 2.0 mm to 0.25 mm; fine sand, 0.25 mm to 0.05 mm; salt, 0.05 mm to 0.005 mm; and clay, particles finer than 0.005 mm. These characteristics are observed for each lithologic unit in reference to its depth of sampling. Much of the report is devoted to viewing these characteristics graphically.

This project has been completed under the auspices of the Department of Natural and Economic Resources intern program through the guidance of Mr. E. P. Allen,

Assistant State Geologist. The geologic divisions and descriptions used in this project were determined by Dr. J. M. Parker, III. Special assistance was given by Mr. W. D. Bingham and Mr. H. F. Koch of the Geology section of the Location Department of the North Carolina State Highway Department.

Procedure

The primary source of soil information was test results obtained by the North Carolina State Highway Department during their subsurface investigations prior to highway construction. All samples were located in reference to their position on the construction project survey line. Depth of sampling was indicated on all test results. Soil profiles which indicate the nature of the soil and the location of groundwater as best could be determined by the sampling technique were prepared by the Highway Department for some projects.

The geologic information was taken from a map of the Wake County geology composed by Dr. J. M. Parker. There are eleven lithologic units delineated on the map. Seven of which are metamorphic rocks ranging from phyllites to gneisses. The remainder of the divisions include the granite of which there are four separately mapped intrusions in Wake County, the Triassic sediments of the western portion of the County, the high level coastal plain sediments of the southern portion of the county and the small scattered ultramafic bodies in the north western portion of the County. Soils consisting of recently transported alluvial and colluvial material were separated from the residual soils through the use of the Wake County Soil Survey map which delineates the transported soil material. When roadway lines were not indicated on the Soil Survey map the information was transferred to the Wake County Highway map for the location of data. The geologic boundaries were determined in reference to each survey line in the location section of this report.

With the location of geologic boundaries and alluvial boundaries, the soil data was grouped according to the rock type over which it was sampled. Tables included in this report are the basic soil test results grouped according to lithologic unit and means and average deviations for the depth intervals within each lithologic unit. Three depth intervals were chosen for the purpose of providing more homogenous data characteristics. The intervals are 0-13 feet classified as the eight-foot interval, 14-23 feet classified as the eighteen-foot interval and greater than 23 feet classified as the twenty eight-foot interval. The depth used to classify a sample was the lower depth of the sample as indicated by the soil test report. Sampling was mostly concentrated in the eight foot depth interval.

Three basic types of graphs were used to illustrate the nature of the information and show possible differences in the soil characteristics among the lithologic groups. Those were frequency curves for each characteristic in the 8-foot depth interval, scatter plots of three independent variables using a stereographic projection, and graphs of mean Atterberg limits (plastic limit & liquid limit) along with the activity for the total lithologic groups and each individual depth grouping.

The frequency curves gave an indication of the distribution of values for a particular characteristic within the 8-foot depth interval. The eight foot interval was chosen for the frequency calculations, because it contained the largest number of samples in each lithologic unit. Frequencies were not determined for any grouping of less than thirty samples. Class mean and the standard deviation were plotted on the frequency graph. All frequencies were calculated in percent so that they may be superimposed to show relationships.

The stereographic projections were an attempt to go beyond ordinary two dimensional plotting. The plotting of two independant variables proved insuf-

ficient to show any distinguishing differences between lithologic units. In order to plot three independent variables, a three dimensional projection was needed. Stereographic projection through the use of a meridian stereographic net (figure 1) projects the points from the upper half of a sphere through the equatorial plane to the lower sole of the sphere. The intersection of the line from the point and the equatorial plane is the projection of that point (figure 2). The three independent variables plotted were depth, activity and plastic limit. Two angles are necessary for plotting each point in spherical coordinates, one horizontal around the equator and one vertical toward the upper pole. These angles were found by using the independent variables to determine the tangests of the angles. In order to get the largest representation for each lithologic group all depth intervals were combined.

The mean Atterberg limit plots were an attempt to distinguish between the lithologic units upon the basis of their plastic limit, liquid limit and activity. In these graphs the values were plotted in a horizontal line with a vertical sequence of rock types. These graphs have been compiled for this report along with detailed descriptions of each lithologic unit.

Description of the Geologic and Soil Units

General

Geology

Wake County, as previously stated, contains metamorphic, igneous, and sedimentary rocks. The metamorphic rocks are phyllites, gneisses, and schists, which before metamorphism, were sedimentary and volcanic rocks. The igneous rocks are mainly granitic intrusive bodies with associated pegmatite and aplite dikes. Diabase dikes, which dissect the triassic, metamorphic, and granitic rocks are found scattered throughout Wake County. Small ultramafic bodies are found in the northwestern corner of the county. The sedimentary rocks indicated

on the map consist of the consolidated triassic rocks in the western portion of the county and the unconsolidated cretaceous and younger sedimentary deposits the southern and eastern sections of Wake County. The alluvial and colluvial material, which has not been delineated on the map, consist mainly of floodplain material.

Soils

The soils of Wake County are extremely variable in depth. This variability is due to the nearly vertical dip of the metamorphic rocks, the minerologic compositional variations and amount of jointing of the granite, and the compositional variations of the triassic rocks. Rock may be outcropping at one location while 200 to 300 feet away, the soil may be 70 to 80 feet deep.

According to Mr. H. F. Koch, the Geology section of the Location Division of the N. C. State Highway Department considers soils with activities greater than approximately 0.40 to be possible problem soils and soils with activities greater than approximately 0.70 as possible undesirable soils.

Detailed Descriptions

In the detailed descriptions of the geologic and soil units which follow, several symbols were used to simplify the descriptions. The symbols used are m = mean, d = average deviation, and r = range in values. The average deviation is stated both as the actual numerical deviation and the amount of deviation in percent. The depths of the soils were determined by the deepest depth of which the auger was refused.

Metamorphics I (M-I)

Metamorphics I (M-I) is a thin band of phyllites which is located in the western portion of Wake County. The western contact is the Jonesboro fault, along which there is evidence of some dynamic metamorphism of the phyllites. The

phyllites are metaconglomerates, metasandstones, and metavolcanics which strike generally northeast and dip nearly vertically to the west.

The soils developed on the phyllites of Metamorphics I range in depth from approximately three feet to 43 feet and are quite possibly deeper. The majority of the soil samples (approximately 85%) are classified as A-7-5 and A-7-6 soils according to the AASHO Classification System. The mean plastic limit for the total number of samples is 30.5 with an average deviation of 6.5 on 21 percent and a range of 13 to 42. The range in liquid limit is 31 to 69, the mean is 51 and the average deviation is 8.4 or 16%. The plasticity index has a mean of 22.7 with an average deviation of 6.5 or 29% and a range of 11 to 33. The soils are fairly active with a mean activity of 0.50 and could very possibly cause problems. With a range in activity of 0.33 to 0.79 and an average deviation of 0.09, the majority of the soil samples could be considered problem soils. The means of the grain size fractions decrease with increasing grain size. Clay (m = 45.7, d = 7.0 or 15%, and r = 28 - 66) is the most predominant size fraction followed by silt (m = 29.2, d = 6.5 or 22%, and r = 14 - 44), fine sand (m = 16.2, d = 4.3 or 27%, and r = 10 - 27), coarse sand (m = 8.3, d = 4.6 or 55%, and r = 1 - 22), and coarse aggregate (m = 3.0, d = 3.1 or 103%, and r = 0 - 12).

In the eight foot interval, the means of the liquid limit, activity, coarse aggregate, coarse sand, and clay increase and the plastic limit, plasticity index, fine sand and silt means decrease from the values of the total number of samples. Since there are only one 18 foot sample and two 28 foot samples, those depth intervals will not be discussed. Their means, deviations, and ranges may be found in Table 1.

Metamorphics I has the highest plasticity index and, except for Metamorphics VI, contains the most material which is silt size and finer.

Metamorphics II (M-II)

Metamorphics II is located in the western part of the county and consists of biotite and hornblende gneisses and schists. The foliation strikes generally northeast and dips very steeply west. There are areas where hornblende amphibolites may be distinguished from the major rocks.

The residual soil of Metamorphics II is extremely variable in depth from zero to at least 73.5 feet deep. The predominant AASHO classification of the soil samples, 65 percent, are A-7-5 and A-7-6. The mean plastic limit is 32.9 with an average deviation of 7.0 or 21% and a range of 18 to 58. The range of the liquid limit is 18 to 72 and the mean is 49.6 with an average deviation of 12.4 or 25%. The plasticity index has a mean of 15.1 and a range of 0 to 42 for an average deviation of 8.4 or 56 percent. The mean activity of 0.43 and average deviation of 0.19 or 44 percent indicate that some problem soils may exist. The range of 0.0 to 1.00 indicates that some undesirable material exists in this soil unit. The soils samples are fine grained with the clay (m = 31.9, d = 10.1 or 32%, and r = 14 - 51), silt (m = 28.3, d = 9.3 or 33%, and r = 8 - 52), and fine sand (m = 26.0, d = 5.5 or 21%, and r = 12 - 39) size fractions predominating. The remaining fractions are coarse sand (m = 13.5, d = 7.9 or 59%, and r = 2 - 38) and coarse aggregate (m = 2.9, d = 2.6 or 90%, and r = 0 - 21).

The mean values in the eight foot interval of the plastic limit, liquid limit, plasticity index, activity, coarse aggregate and clay increase and the coarse sand, fine sand, and silt means decrease, respective to the means of the total samples.

The mean values of the plastic limit, liquid limit, plasticity index, activity, coarse aggregate and clay of the 18 foot interval decrease and the mean values of coarse sand, fine sand, and silt increase when compared to the values of the eight foot interval. For the 28 foot interval, means of the plastic limit, liquid limit, activity, fine sand, silt, and clay decrease and the means of the

plasticity index, coarse aggregate, and coarse sand increase. The numerical values for the 18 and 28 foot depth may be obtained from Table 1.

The soils of Metamorphics II have no distinguishing characteristics when compared with the other soil units except that the mean value of the activity X 10^2 remains between the liquid limit and the plastic limit and within 3 to 4 units of the liquid limit.

Metamorphics III (M-III)

Metamorphics III is located in the central part of the county and underlies the western section of Raleigh. The rocks are felsic gneisses and mica schists which are low in biotite content and high in quartz, potassium feldspar, and muscovite. Some of the rocks are quartz disk gneisses and lineated quartzite gneiss. The gneisses and schists grade into phyllites in the southern and southeastern parts of the county. Two graphite veins, the eastern vein extending north and the western vein extending south, are found in the central section of Metamorphics III. The foliation of the rocks strikes generally northeast. In the western half of the unit, the foliation dips steeply to the west and in the eastern half, it dips steeply, almost vertically to the east.

The soils of Metamorphics III which were sampled were those which developed from the gneisses and schists. No samples were obtained from the soils which developed from the phyllites. The soils range in depth from zero to 75 feet and possibly deeper.

The soil samples are fairly evenly distributed between A-4, A-5, A-6, A-7-5, and A-7-6 soils, according to the AASHO classification system. The plastic limit ranges from 14 to 45 and has a mean of 25.0. The average deviation is 6.6 or 25 percent. The mean liquid limit is 41.7 and the average deviation is 9.1 or 22 percent over a range of 19 to 67. The plasticity index has a mean of 13.1 with an average deviation of 7.5 or 57 percent and a range of zero to 43. The mean

activity of 0.37 is below the boundary for problem soils but the average deviation of 0.17 or 46% and the range, 0.0 to 0.86, implies that possible problem soils exist. Fine sand (m = 32.6, d = 7.4 or 23%, and r = 13 - 62) and clay (m = 31.6, d = 9.3 or 29%, and r = 11 - 59) are the predominant grain size fractions. Silt (m = 22.7, d = 5.7 or 25%, and r = 9 - 41) is the next predominant fraction followed by coarse sand (m = 12.4, d = 5.8 or 47%, and 4 = 1 - 35) and coarse aggregate (m = 4.6, d = 2.2 or 48%, and r = 0 - 25).

The plastic limit, liquid limit, coarse sand, and silt mean values decrease with respect to the means of the total samples and the means of plasticity index, activity, coarse aggregate, fine sand and clay increase. The means of the plastic limit, liquid limit, coarse sand, and silt in the 18 foot interval have increased and the means of the plasticity index, coarse aggregate, fine sand, and clay have decreased when compared to the eight foot interval. The mean activity does not change from the eight foot to the 18 foot interval and only decreased by 0.01 in the 28 foot interval. The means of the plasticity index, coarse aggregate, silt, and clay also decrease when the 28 foot interval is compared with the 18 foot interval, while the means for the plastic limit, liquid limit, coarse sand, and fine sand increase. For the numerical values of the depth interval means refer to Table 1.

The soils of Metamorphics III have a mean activity which remains very constant through the depth intervals and contain the largest percentages of non plastic (Plasticity index = 0) soils of all the soil units.

Metamorphics IV (M-IV)

Metamorphics IV is located in the central part of the county, underlying central and eastern Raleigh. The rocks are layered mica gneiss which has been injected by granite, pegmatite and aplite. The contact between Metamorphics IV and the Rolesville granite is gradational due to the numerous inclusions of the gneiss in the granite and granite dikes in the gneiss.

The soils of Metamorphics IV range in depth from zero to at least 45 feet

and have AASHO classifications of A-4, A-5, A-6, A-7-5, and A-7-6. The plastic limit mean for all samples is 28.7, the average deviation is 6.6 or 23 percent, and the range is 12 to 52. The mean liquid limit is 46.1 with an average deviation of 10.1 or 22% and a range of 19 to 77. The plasticity index ranges from zero to 41 and has an average deviation of 6.9 or 39% and a mean of 17.7. Some very active material is found in the rocks of Metamorphic IV as the range, 0.0 to 1.24 implies. The mean activity is 0.55 and the average deviation is 0.17 or 31%; therefore, problem and undesirable material probably exists in the soil of Metamorphics IV. The two predominant grain size fractions are clay (m = 30.8, d = 7.1 or 23%, and r = 12 - 65) and coarse sand (m = 28.3, d = 7.6 or 27%, and r = 2 - 51). The remaining material falls into the fine sand (m = 21.7, d = 4.0 or 19%, and r = 7 - 37), silt (m = 19.2, d = 4.4 or 23%, and r = 6 - 55), and coarse aggregate (m = 3.2, d = 4.4 or 131%, and r = 0 - 18) size fractions.

The plastic limit, fine sand, and silt means are lower and the liquid limit, plasticity index activity, coarse aggregate, coarse sand, and clay means are higher for the eight foot interval than for the total number of samples. The plastic limit, fine sand, and silt means of the 18 foot interval and the coarse aggregate, fine sand, and silt means of the 28 foot interval increase while the liquid limit, plasticity index, activity, coarse aggregate, coarse sand, and clay means of the 18 foot interval and the plastic limit, liquid limit, plasticity index, activity, coarse sand, and clay means of the 28 foot interval decrease. The numerical values of the depth interval means may be detained from Table 1.

Metamorphics IV has the highest mean activity of all the soil units and the lowest mean for clay except for the alluvial material.

Metamorphics V (M-V)

The rocks of Metamorphics V are located in the eastern corner of the county, just east of Zebulon, and consist of mica gneiss.

The soils developed from the weathering of the mica gneiss range in depth

to at least 28 feet and are probably much deeper. Approximately 60 percent of the soil samples have AASHO classifications of A-7-5 and A-7-6. The other samples are fairly evenly divided between A-4 and A-6. For the total number of samples, the plastic limit has a range of 13 to 48, a mean of 29.0, and an average deviation of 5.8 or 20%. The mean liquid limit is 49.3, the average deviation is 15.3 or 31%, and the range is 13 to 102. The plasticity index has a mean of 20.3 with an average deviation of 9.5 or 47% and a range of zero to 66. The activity has a mean of 0.51 and an average deviation of 0.13 or 26% which indicate the possibility of problem soils. The range in activity of 0.0 to 1.02 also indicates the presence of some undesirable material. Clay (m = 37.3, d = 10.2 or 27%, and r = 14 - 65), fine sand (m = 25.0, d = 6.8 or 27%, and r = 6 - 44), and silt (m = 22.6, d = 5.6 or 25%, and r = 11 - 41) are the predominant grain size fractions. Coarse sand (m = 15.4, d = 7.2 or 47%, and r = 1 - 38) and coarse aggregate (m = 3.2, d = 3.6 or 112%, and r = 0 - 24) constitute the remainder of the fractions.

The plastic limit, liquid limit, plasticity index, activity, coarse sand, silt, and clay means are lower and the coarse aggregate and fine sand means are higher for the eight foot interval than the means of the total samples. For the 18 foot interval, the means of the plastic limit, liquid limit, plasticity index, activity and silt are higher and the means of coarse aggregate, coarse sand, fine sand, and clay are lower than the eight foot interval. The mean values in the 28 foot interval of the plastic limit, liquid limit, fine sand, silt, and clay are lower and the mean values of the activity, coarse aggregate, and coarse sand are higher than the means of the 18 foot interval.

The mean activity of Metamorphics V reacts differently with change in depth than the mean activities of the other soil units. The mean activity of Metamorphics V increases with an increase in depth.

Metamorphics VI

Metamorphics VI is located in the extreme eastern corner of Wake County and consists of phyllites composed of fine grained mica and argillaceous material. The unit strikes northeast and dips steeply east.

The residual soil developed on the phyllites ranges in depth from five feet to at least 34.5 feet. Actually, the shallowest depth at which rock was encountered is 11 feet and the deepest was 34.5 feet. The five feet depth was selected because many of the holes were not drilled deeper than five feet; therefore, rock may possibly be found just below five feet. The soil is possibly deeper than 35 feet in many locations.

Slightly more than half of the samples were classified as A-7-5 and A-7- and the rest are mainly A-4 and A-6 with some A-5 and A-2-4. For the total number of soil samples, the range in value of plastic limit is 18 to 47 with a mean of 34 and an average deviation of 5.6 or 17 percent. The liquid limit ranges from 21 to 69 with a mean of 46.3 and an average deviation of 10.8 or 23 percent. The plasticity index is variable with a mean of 13.3 and an average deviation of 6.3 or 47 percent over a range from 2 to 35. The mean activity of 0.32 indicates the soil of Metamorphics VI is generally an inactive soil, but the average deviation of 0.11 or 34 percent and a range of 0.11 to 0.70 indicate that some problem soils could exist. Twenty-nine percent of the soil samples have activities greater than 0.40 and therefore could possibly be problem soils. The silt fraction contains the greatest amount of material with a mean of 42, an average deviation of 8.2 or 20 percent, and a range of 22 to 60. The next predominant fraction is clay with a mean of 36.2, an average deviation of 9.4 or 26%, and a range of 18 to 62, followed by fine sand (m = 14.2, d = 6.1 or 43%, and r = 4 - 31), coarse sand (m = 5.8, d = 3.4 or 58%, and r = 1 - 17), and coarse aggregate (m = 3.9, d = 4.2 or 108%, and r = 0 - 24).

The mean values of the liquid limit, plasticity index, activity, coarse aggregate, fine sand, and clay are higher and the mean values if the plastic limit, coarse sand, and silt are lower for the eight foot interval than the means for the total number of samples. For the 18 foot interval, the means of the plastic limit, coarse sand, and silt increase and the liquid limit, plasticity index activity, coarse sand, fine sand, and clay decrease when compared with the eight foot interval. In the 28 foot interval, there is an increase in the means for coarse aggregate, coarse sand, and clay, and a decrease in the means for plastic limit, liquid limit, plasticity index, activity, fine sand and silt, when compared with the 18 feet interval. For the numerical values for the various depth intervals, refer to Table 1.

When compared to the other soils in Wake County, Metamorphics VI has the lowest mean activity, fine sand, and coarse sand and except for the alluvial material, the lowest plasticity index. It also has the highest means for plastic limit and silt and contains the most material which is silt size and finer.

Metamorphics VII (M-VII)

Metamorphics VII consist of hornblende amphibolite which has been mapped in the southern part of Wake County. Other bodies may be distinguishable in other parts of the county.

The authors could not locate any soil information due to the lack of recent investigations in that part of the county.

Granite (G)

The granite is found as a large intrusion, the Rolesville quartz monzonite, underlying most of Wake County, east of Raleigh and as several smaller intrusions scattered about the county.

The Rolesville (Grl) quartz monzonite contacts are gradational due to sills and dikes in the metamorphic rocks and inclusions of the metamorphic rocks in the granite. The body actually consists of a finer grained medium dark quartz monzonite

and a younger, lighter coarser grained granite. They exhibit small scale mixing and are not found as two large distinct plutons. A pegmatite and aplite dike system dissects both the granite and the metamorphic rocks.

The Reedy Creek (Grc) quartz monzonite is located along Reedy Creek at Umstead Park in western Wake County and consists of quartz monzonite lenses with adjacent sills injected to the North and East. The Wyatt (Gwy) Granite is a muscovite granite located around the community of Wyatt in northeastern Wake County just southwest of Wake Forest. The Buckhorn (Gbh) stock is found in southwestern Wake County, west of Fuquay-Varina and south of Holly springs. There is also some granite around Sunset Lake but it has not been mapped at the time of this report.

The soil developed on the granite is very irregular in depth, very frequently containing groups of boulders embedded in the soil. Some of the boulders are large enough to require blasting in order to be excavated. In many places the granite outcrops on the surface while in others, the soil is at least 60 feet deep.

During this project, the authors were able to obtain soil samples for only two of the intrusions, the Rolesville and the Reedy Creek, with only four soil samples for the Reedy Creek. The mean plastic limit for the total number of samples is 27.8 with an average deviation of 6.7 or 24% and a range of 13 to 59. The range for the liquid limit is 13 to 97 with a mean of 41.3 and an average deviation of 9.4 or 23%. The plasticity index has a mean of 14.3 with an average deviation of 6.7 or 47% over a range of 0 to 54. The mean activity of 0.42 with an average deviation of 0.15 or 35% is very close to the border between inactive and problem soils. The range of 0.0 to 1.03 indicates that some of the soils are possibly undesirable. In the grain size distribution, clay (m = 31.1, d = 8.2 or 26%, and r = 8 - 70) and coarse sand (m = 28.7, d = 6.6 or 23%, and r = 2 - 52) are the predominant fractions. Fine sand (m = 22.1, d = 6.6 or 30%, and r = 4 - 46),

silt (m = 17.1, d = 5.0 or 29%, and r = 5 - 42) and coarse aggregate (m = 0.39, d = 0.39 or 100%, and r = 0 - 18) are the remaining fractions.

In the eight foot interval the means of the liquid limit, plasticity index, activity, coarse sand, and clay are greater and the means of fine sand and silt are less than the total samples. The means of the plastic limit and coarse aggregate did not change. For the 18 foot depth interval, when compared to the eight foot interval, the mean plastic limit, fine sand, and silt increase and the mean liquid limit, plasticity index, activity, and clay decrease while the mean for coarse aggregate remains the same. At the 28 foot interval, there is an increase in the means of the activity, coarse aggregate, fine sand, and silt, while the means of the plastic limit, liquid limit, plasticity index, and coarse sand decrease. There is a large decrease in the clay mean. For numerical values for the depth intervals, the reader is referred to Table 1.

Granite has the lowest mean silt fraction and the highest, along with Metamorphics IV, coarse sand fraction.

Ultramafics (Umf)

The Ultramafics are located in the northwestern corner of Wake County and consist of serpentinite and soapstone which are altered dunite, talc-chlorite schist, and hornblende gabbro which is possibly related to the amphibolites.

The soils developed on the ultramafics range in depth from zero to at least 35 feet and quite possibly deeper. Those of the five soil samples in the Ultramafics were classified as A-7-5, one as A-7-6 and one as A-4 according to the AASHO Classification System.

The mean of the plastic limit is 30.8 with an average deviation of 4.6 or 15% and a range of 23 to 42. The liquid limit ranges from 33 to 77 and has a mean of 51.8 with an average deviation of 15.4 or 30%. The plasticity index has a mean of 21.0, an average deviation of 27.3 or 130%, and a range of 10 to 49. The mean activity is 0.41 which is on the border of problem soils. The average deviation

of 0.12 or 29% and the range of 0.26 to 0.72 indicate the presence of problems. In fact, a large amount of the soils of the Ultramafics could be problem soils due to the talc and soapstone. Clay (m = 46.6, d = 13.7 or 29%, and r = 26 - 66) is the predominant grain size fraction. Silt (m = 21.2, d = 3.8 or 18%, and r = 16 - 28) and fine sand (m = 21, d = 13.6 or 62%, and r = 12 - 34) are the next predominant fractions, followed by coarse sand (m = 11.2, d = 6.2 or 56%, and r = 5 - 19) and coarse aggregate (m = 0.8, d = 0.6 or 75%, and r = 0 - 2).

The soils of the Ultramafics have the highest mean values for the liquid limit and the clay size fraction and the lowest mean for coarse aggregate of all the soil units.

Diabase Dikes (db)

Diabase dikes are scattered throughout Wake County. No samples from diabase dikes were obtained, but according to Mr. H. F. Roch, the soil developed from the diabase is very undesirable material. The soil is often very fine grained, and when moist, is very slick and sticky. Round boulders of diabase are often found in the soil.

Triassic (Tr)

The Triassic rocks are located in the western edge of the county. They are sedimentary rocks deposited in a basin formed by movement along the Jonesboro fault. The western side of the fault moved downward relative to the eastern side and the sedimentary rocks were deposited in the basin as a result of the erosion of the eastern side of the scarp. Fanglomerates are found in the eastern part of the basin, along with arkoses, siltstones, and mudstones, some of which are red. Some calcareous sandstones and limestone lenses are found interbedded with the non-calcareous rocks. The Jonesboro fault and the sedimentary beds strike generally northeast and dip very gently to the east.

The bedded nature and the variations in consolidation of the Triassic rocks make it difficult to determine the actual depth of the soils. Often, a thin hard

bed will overlie a thick poorly consolidated bed of undesirable material. The poor quality material will not be detected due to the refusal of the auger by the thin hard bed. Auger holes have been made to depths of 36 feet.

The majortiy of the Triassic soils have been classified as A-4 and A-6 with some classified as A-7-5 and A-7-6. The mean plastic limit is 20.6, the average deviation of 3.4 or 16%, and the range is 8 to 48. The liquid limit has a range of 20 to 61 and a mean of 37.3 with an average deviation of 7.7 or 21 percent. The mean plasticity index is 16.4 with an average deviation of 6.1 or 37% and a range of 4 to 36. The Triassic soils contain critical and undesirable material as indicated by the mean activity of 0.50 and the range of 0.13 to 1.21. The average deviation is 0.17 or 34%. The predominant grain size fractions are clay (m = 32.4, d = 7.0 or 22%, and r = 12 - 60) and silt (m = 31.4, d = 7.7 or 25%, and r = 4 - 59). The remaining fractions are coarse sand (m = 21.3, d = 10.0 or 47%, and r = 1 - 47), fine sand (m = 14.9, d = 14.3 or 96%, and r = 3 - 36), and coarse aggregate (m = 3.6, d = 4.4 or 122%, and r = 0 - 37).

For the eight foot interval, the plastic limit, coarse aggregate, silt, and clay means are higher and the liquid limit, plasticity index, activity, and coarse sand means are lower than the means of the total samples. The fine sand mean remains the same. When the 18 foot interval is compared with the eight foot interval, an increase in the means of the plastic limit, liquid limit, plasticity index, activity, coarse sand, and fine sand is observed along with a decrease in coarse aggregate, silt, and clay. In the 28 foot interval, the means of the plasticity index, fine sand, silt, and clay increase and the means of the plastic limit, liquid limit, activity, coarse aggregate, and coarse sand decrease.

The soils of the Triassic rocks have the second lowest plastic limit and liquid limit of the different soil untis. Only the alluvial and colluvial soils have lower plastic and liquid limit means.

Coastal Plain Sediments (Cp)

The Coastal Plain sediments are found as hill cappings in the southern and eastern parts of the county. The contact with the underlying rocks is unconformable. The unconformity has a relief of approximately 10 feet and dips generally to the southeast at 10 to 15 feet per mile. The elevation of the contact is approximately 300 feet in the southeastern part of the county. Except for the mocks formation, most of the material is fluvial. The basal material is usually a poorly sorted gravel, sand, silt, and clay mixture with rounded and subangular pebbles. The formations in the Fuquay area are the Tuscaloosa Formation, Createcous in age, overlain by the Mocks Formation of Miocene age and the Pinehurst of Miocene - Pliocene age. The deposits around Garner are post-Eocene, just as the deposits east of Zebulon probably are. Deposits of what has been called "Castle Hayne" silicified limestone (buhrstone) are probably re-worked Eocene material consisting of cobbles and boulders in gravelly sand, the age of which is presumed to be Pliocene or Pleistocene in age. The cobbles and boulders were not found in situ.

Due to the absence of recent subsurface investigation in the southern part of Wake County, where the deposits are thick enough to be of engineering importance, soil samples were not obtained for the Coastal Plain material. East of Zebulon, the deposits were not thick enough to be detected during the sampling, probably because the top of the test holes were below the unconformity.

Alluvium (Al)

The alluvial and colluvial material is located mainly in the floodplains and terraces of creeks, streams, and rivers and also at the base of the slope of hills. The material consists of clays, silts, sands, and gravels along with organic material.

The greatest depth of the material sampled was 12 feet. Most of the

samples were 5 feet deep and were classified as A-2-4, A-4, and A-6 with a few A-7-5 and A-7-6. The plastic limit has a mean of 20.5, an average deviation of 3.9 or 19 percent, and a range of 15 to 40. The liquid limit has a mean of 30.6 with an average deviation of 7.6 or 25% and a range of 16 to 60. The range in plasticity index is zero to 41 and the mean is 10.8 with an average deviation of 6.2 or 57%. The alluvial material is fairly inactive as a whole with a mean of 0.39, but the average deviation of 0.17 or 43% and the range of 0.0 to 1.10 indicate the presence of problem or undesirable soils. The predominant size fractions are fine sand (m = 30.3, d = 9.8 or 32%, and r = 12 - 55), clay (m = 25.5, d = 6.5 or 25%, and r = 6 - 39), and silt (m = 25.2, d = 9.5 or 38%, and r = 12 - 53). Coarse sand (m = 18.6, d = 9.2 or 50%, and r = 4 - 49) and coarse aggregate (m = 4.2, d - 4.6 or 110%, and r = 0 - 22) make up the remaining fractions.

The alluvial material has the lowest means for plastic limit, liquid limit, plasticity index, and clay when compared with the rest of the soil units.

Conclusion

The graphic displays used in this project have indicated that certain distinctions can be drawn if the methods are utilized effectively. The major distinction shown by the mean Atterberg limit plots has been that between soils developed over crystalline rock and soils developed over sedimentary rocks. The crystalline rocks were found to have widely varying activity values with plastic limits generally greater than twenty five. While the soils developed over sedimentary rocks and soils of sedimentary origin have moderate to high activity values with plastic limits generally less than twenty five. The crystalline rocks have such widely variable residual soils that no definite distinctions could be seen within them.

No definite distinctions could be seen from the stereographic projections.

This is probably due to the choice of variables to be displayed. The variables displayed were plastic limit, activity and depth of sampling. Of these only plastic limit and activity are based on actual soil analysis and depth of sampling is an arbitrary decision of the driller. If the depth of sampling had been replaced by an actually tested characteristic of the soil, such as the fraction of material passing a #200 sieve, the results might have been more profitable; however, time did not allow us to persue this possiblility.

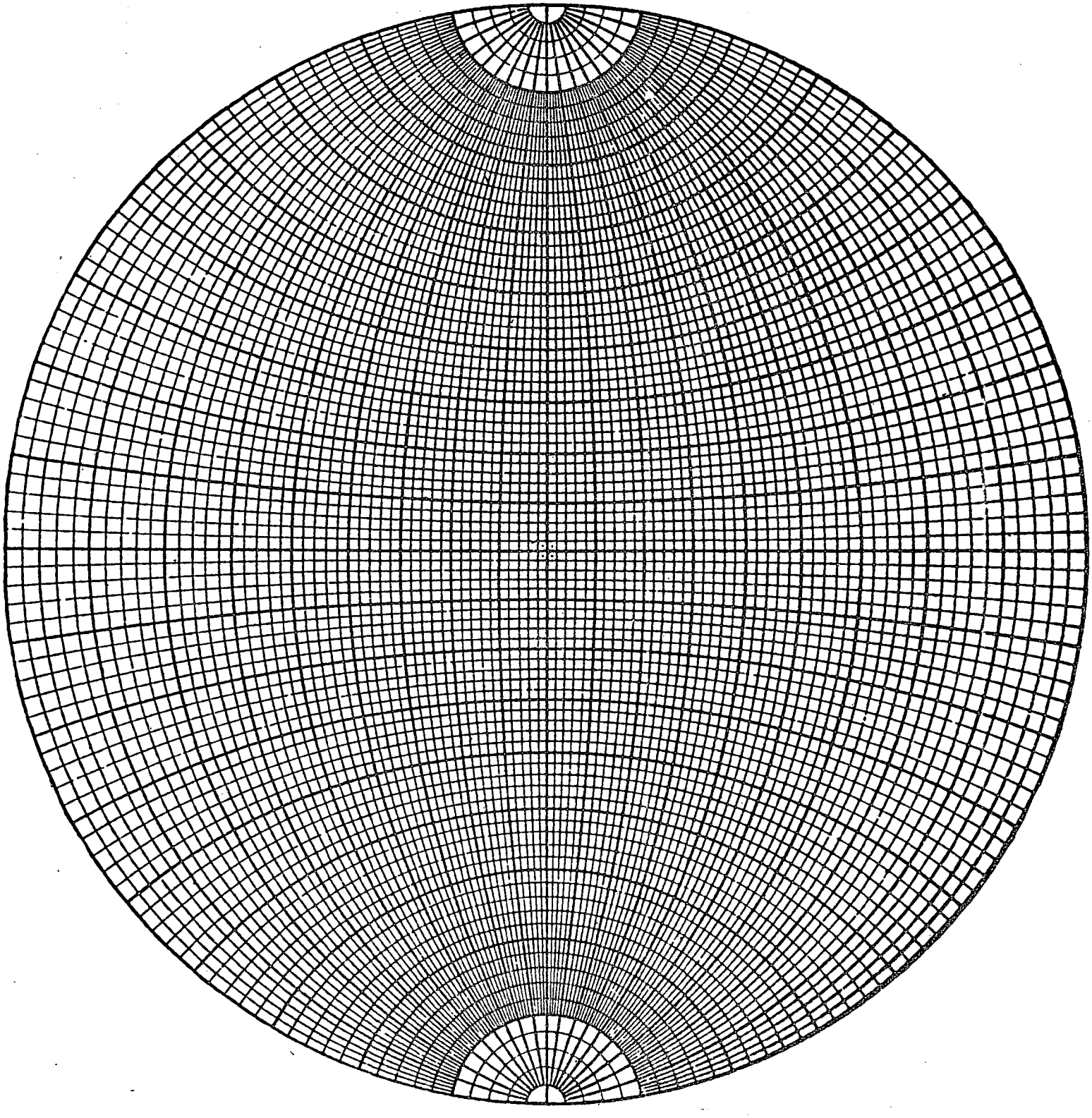
The amount of actual soil testing done by the North Carolina State Highway Department has been steadily increasing over the past fifteen years. This has been caused by a steadily increasing need for knowledge of the subsurface conditions of the roadway. Soil sampling is highly based upon the judgement of the driller as to what differences in soil type are significant enough to have analyzed. No two drillers will have identical judgements. The soil is sampled from a depth interval within which the soils are mixed together in an attempt to attain an average sample for the interval. Depth intervals for sampling range from one and two feet in length up to as much as thirty and thirty five feet. One improvement in sampling already implemented is the sampling of soil at specific intervals along the roadway regardless of the character of the soil. Another improvement which would make the data much more useful in a scientific study would be to set a specific depth interval for sampling so that a more specific statistical population could be established.

There have been two major problems with the accumulation of data for this project. They are incomplete records or discarded records and the continuing evolution of the method of sampling. The incomplete records are caused by the inherent tendency for governmental agencies to streamline and cut cost. Data which takes up space and seems of no use is sometimes thoughtlessly discarded in the name of efficiency. This has been the case with a large number of soil profiles which compiled for some of the older roadway projects. Without the soil profile

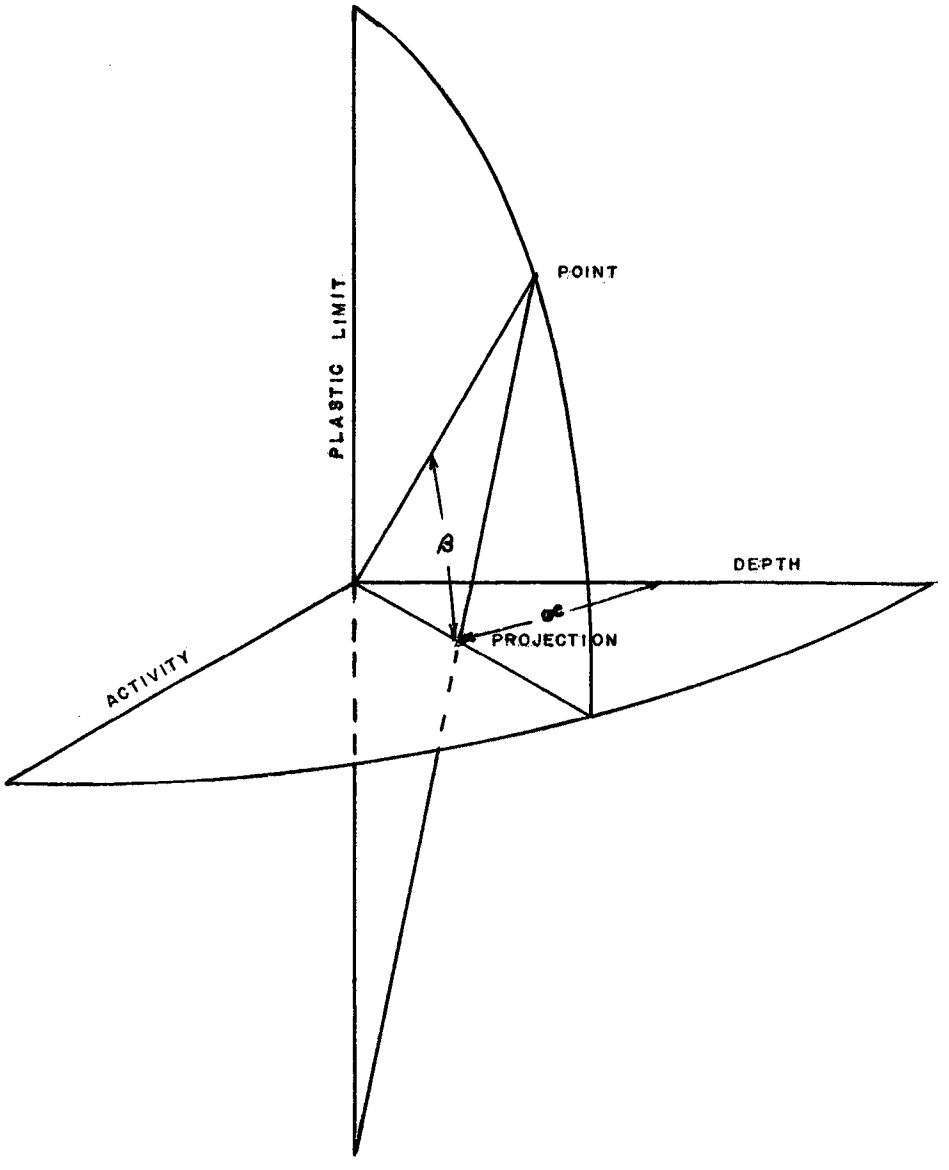
the location of specific data points and lithologic boundaries was made more difficult.

The continuing evolution of the method of sampling has caused a variability in the completeness of coverage for several lithologic units. In older roadway projects the alluvial material was generally ignored as far as testing its characteristics, because streams and alluvial valleys were nearly always buried by fill. This caused a great lack of data for alluvial and recently transported soils. In very old roadway projects samples were only taken where the driller thought construction problems would be encountered. This caused large sections of roadway to go unsampled leaving gaps in the data.

Much improvement has already been incorporated into the North Carolina State Highway Department's Subsurface investigation techniques and in the future a project such as this could contribute greatly to the understanding of soils and their relations to the parent rocks.



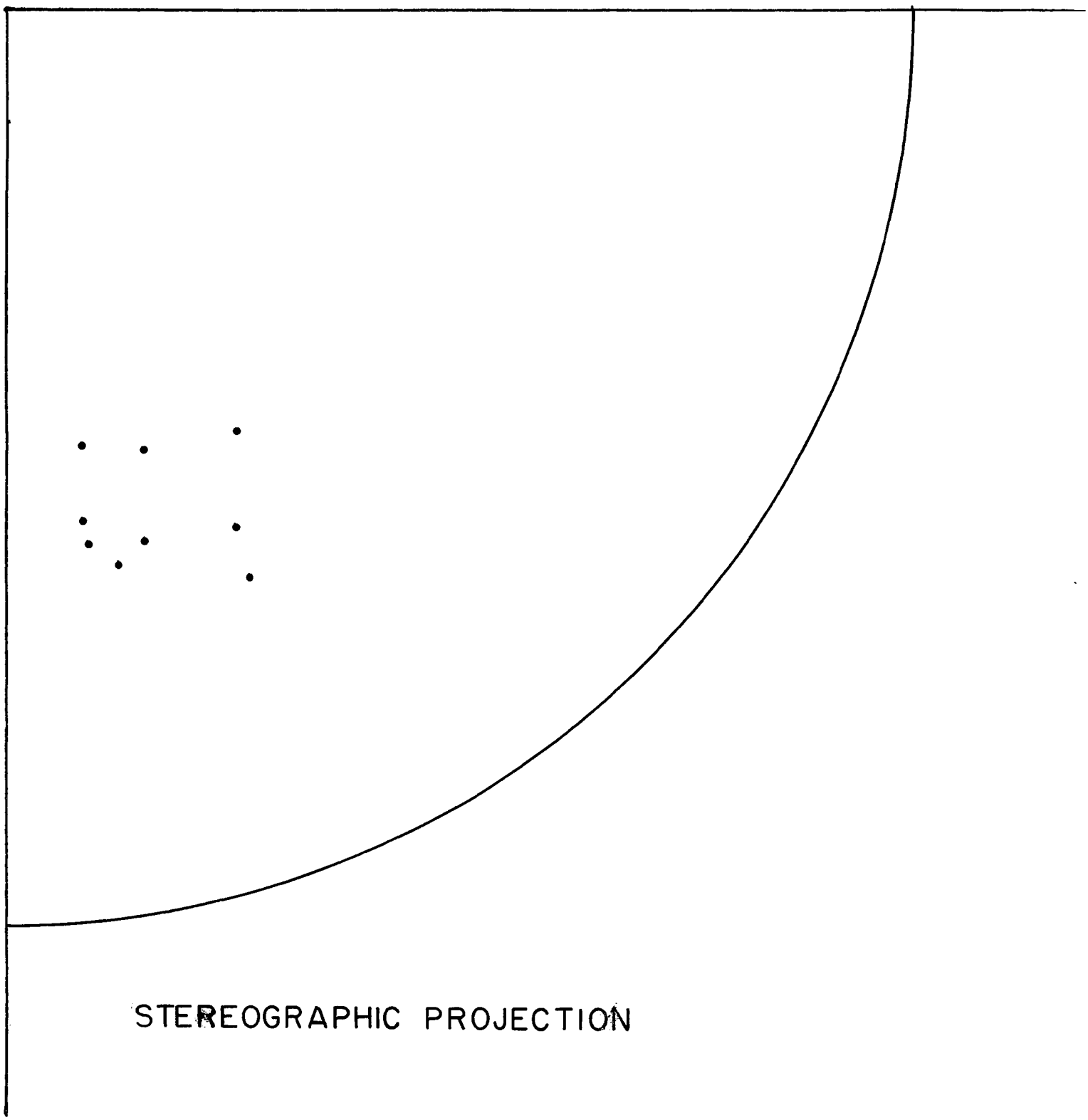
STEREOGRAPHIC NET
Figure 1



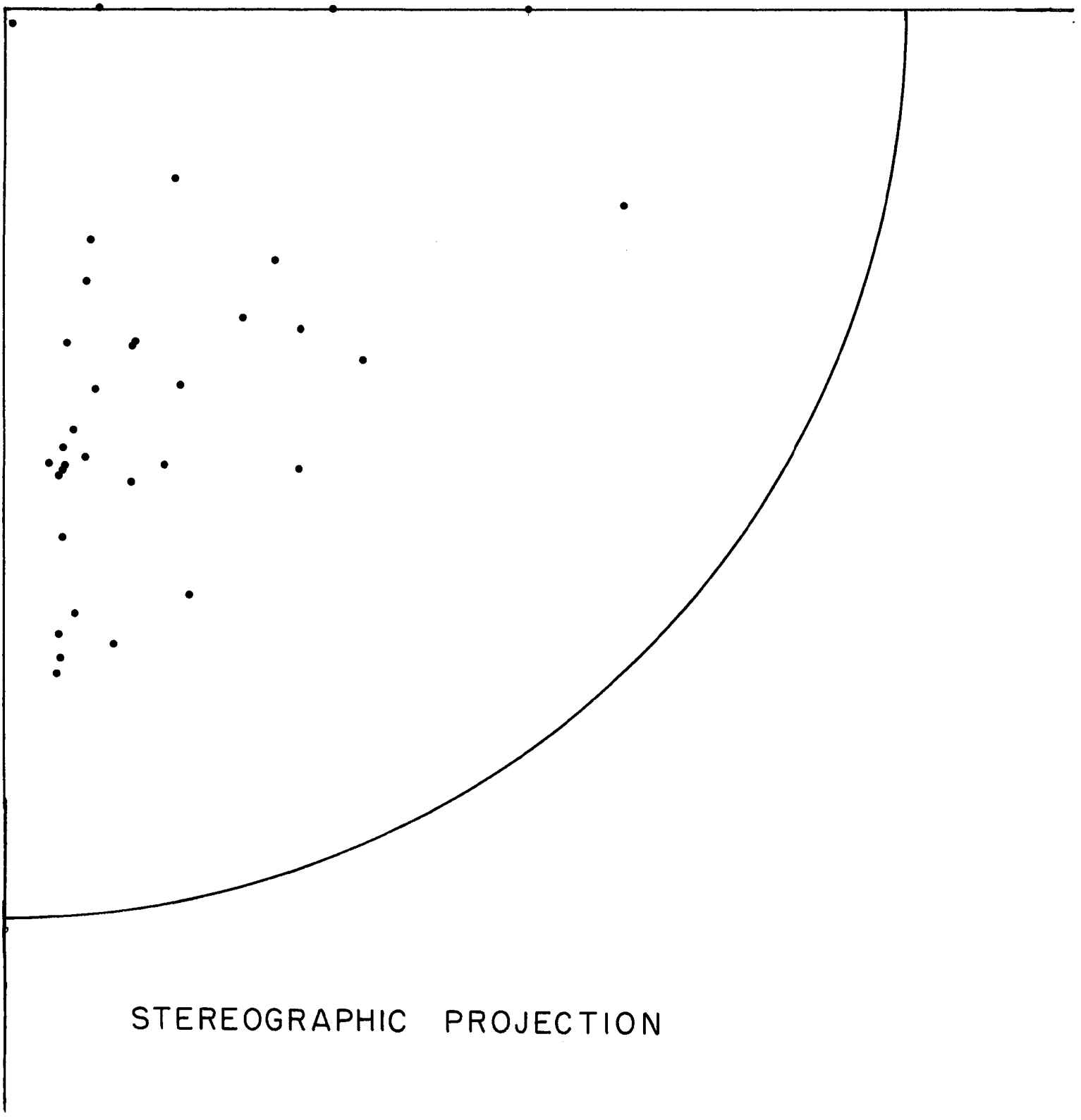
STEREOGRAPHIC PROJECTION

FIGURE 2

META I

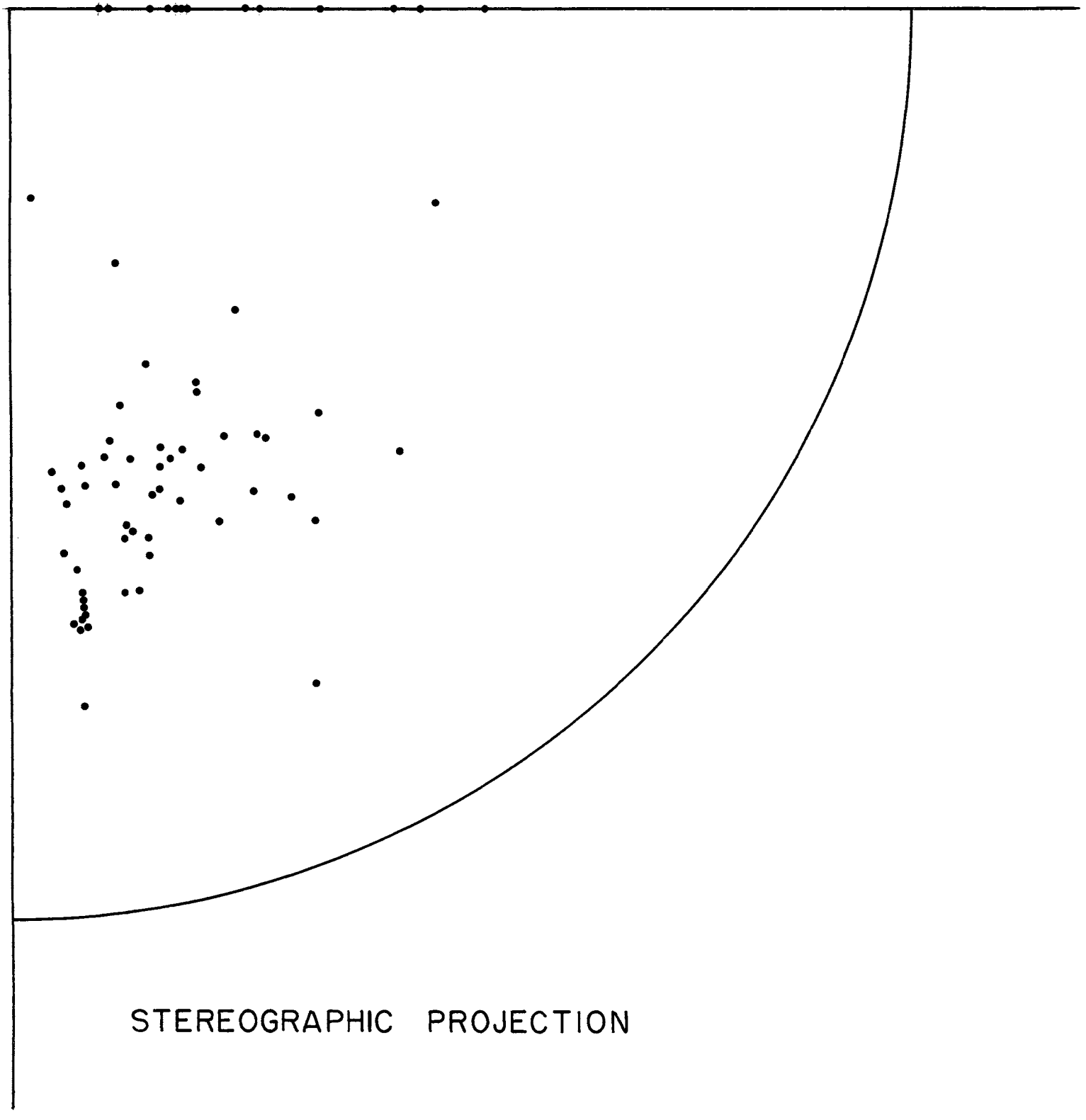


STEREOGRAPHIC PROJECTION



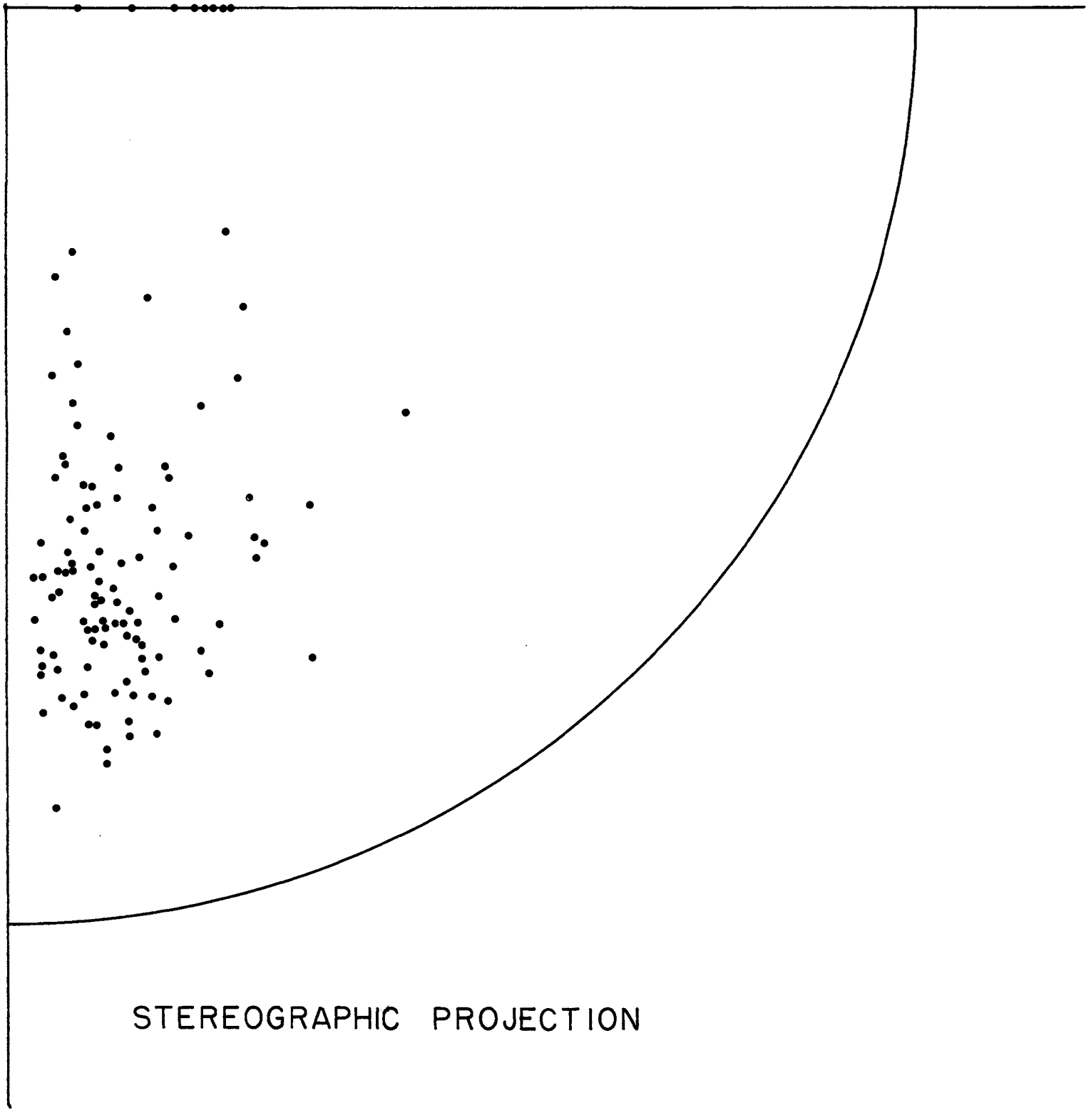
STEREOGRAPHIC PROJECTION

META III



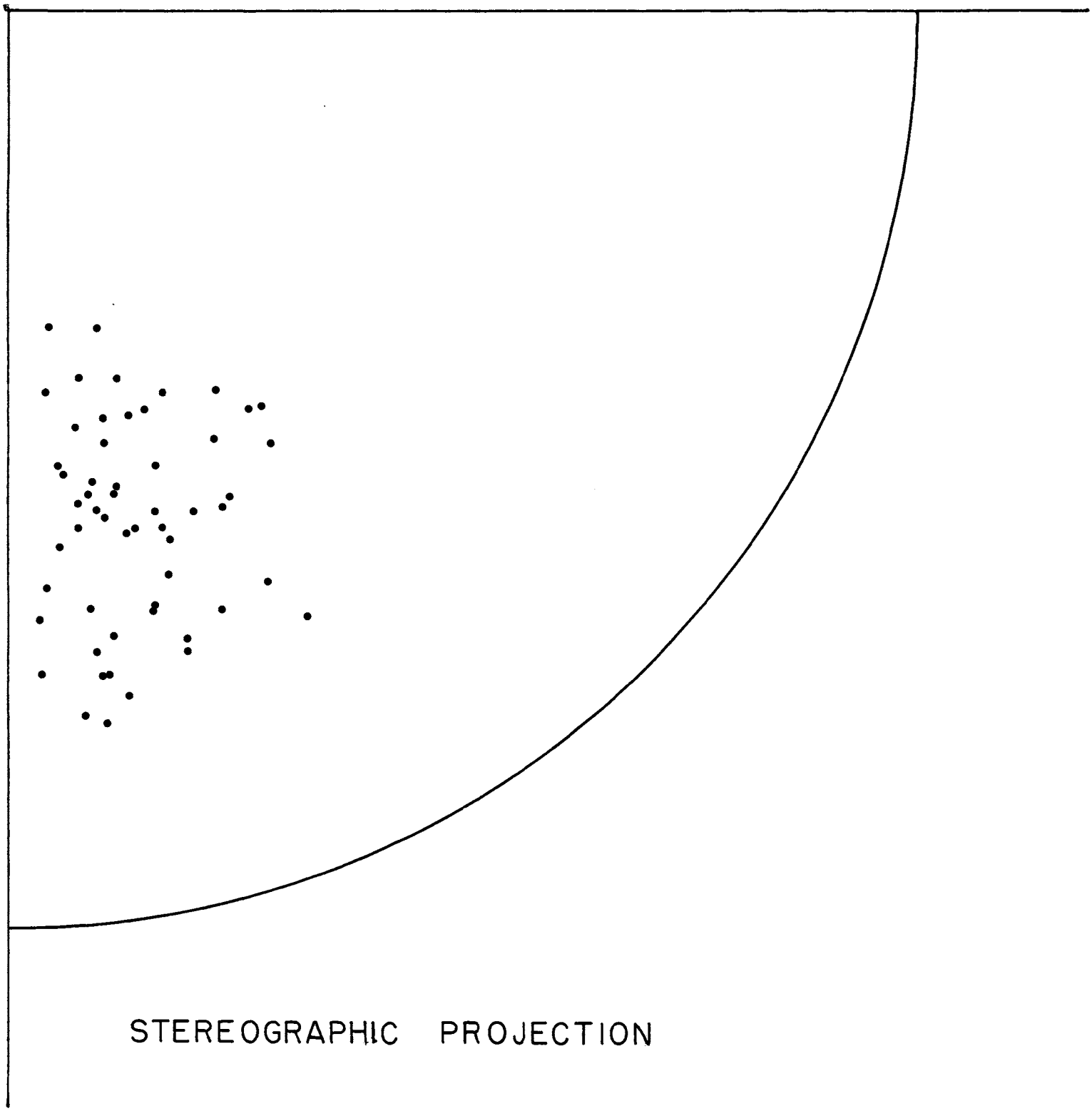
STEREOGRAPHIC PROJECTION

META IV



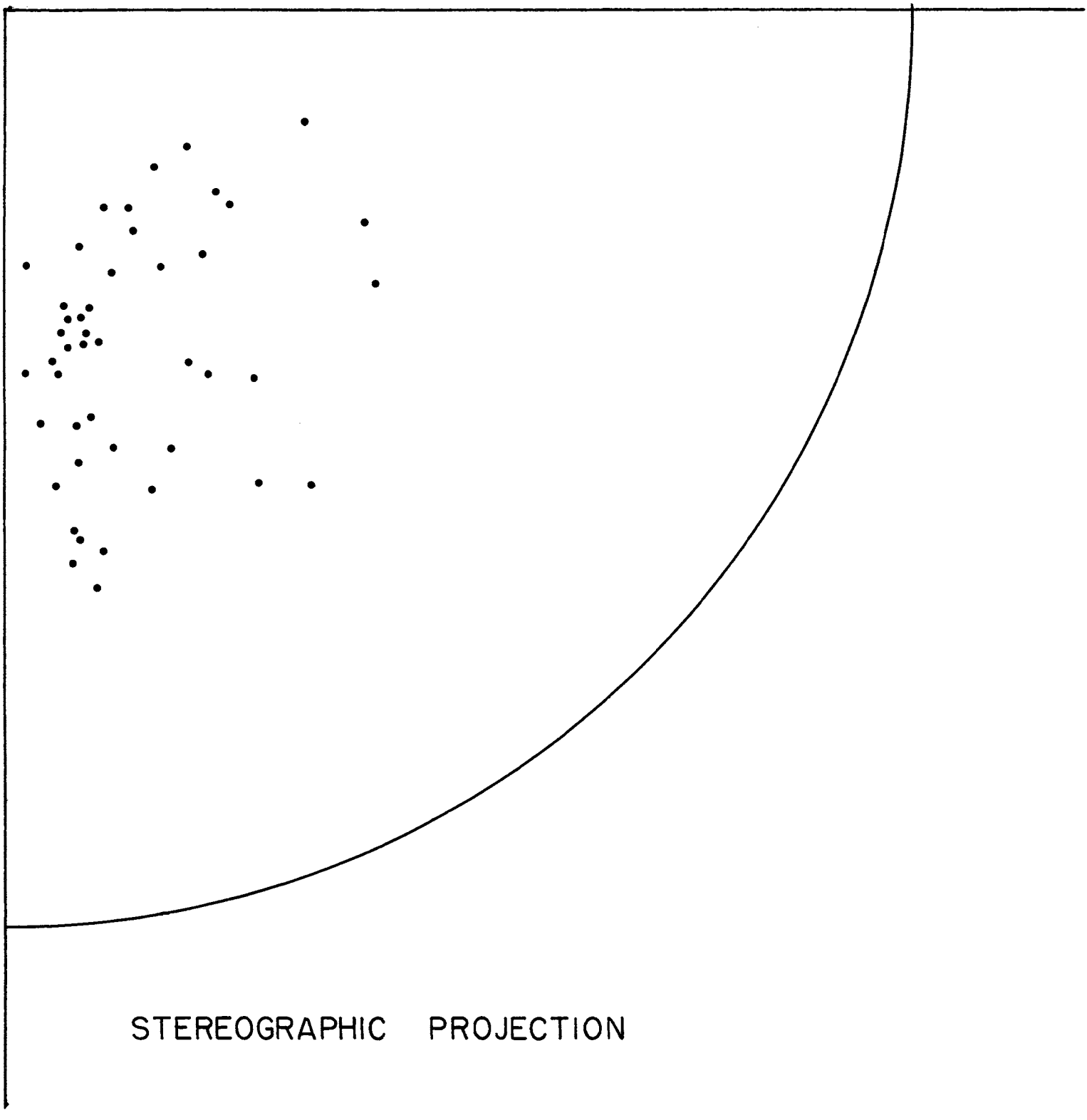
STEREOGRAPHIC PROJECTION

META V



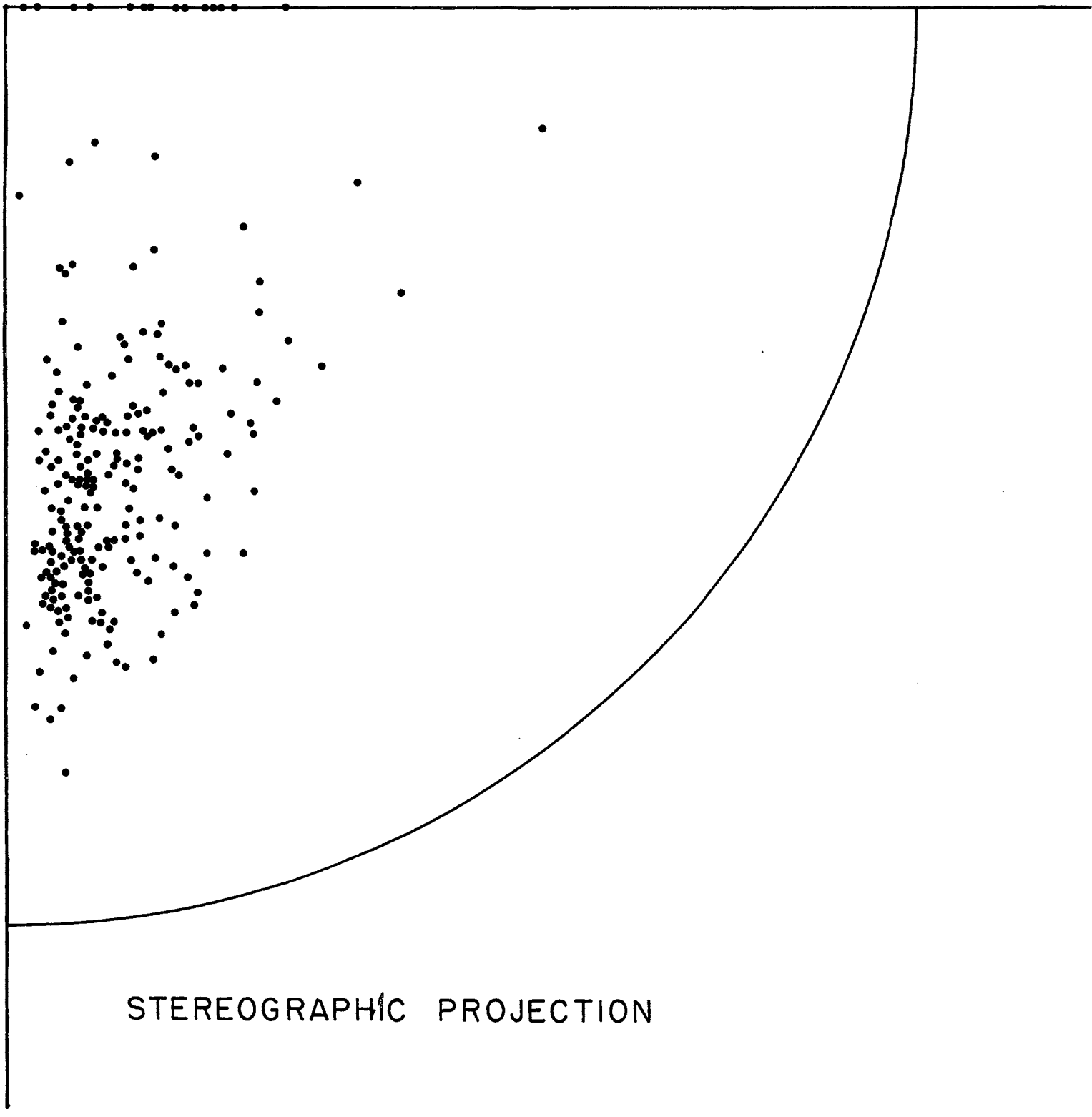
STEREOGRAPHIC PROJECTION

META VI



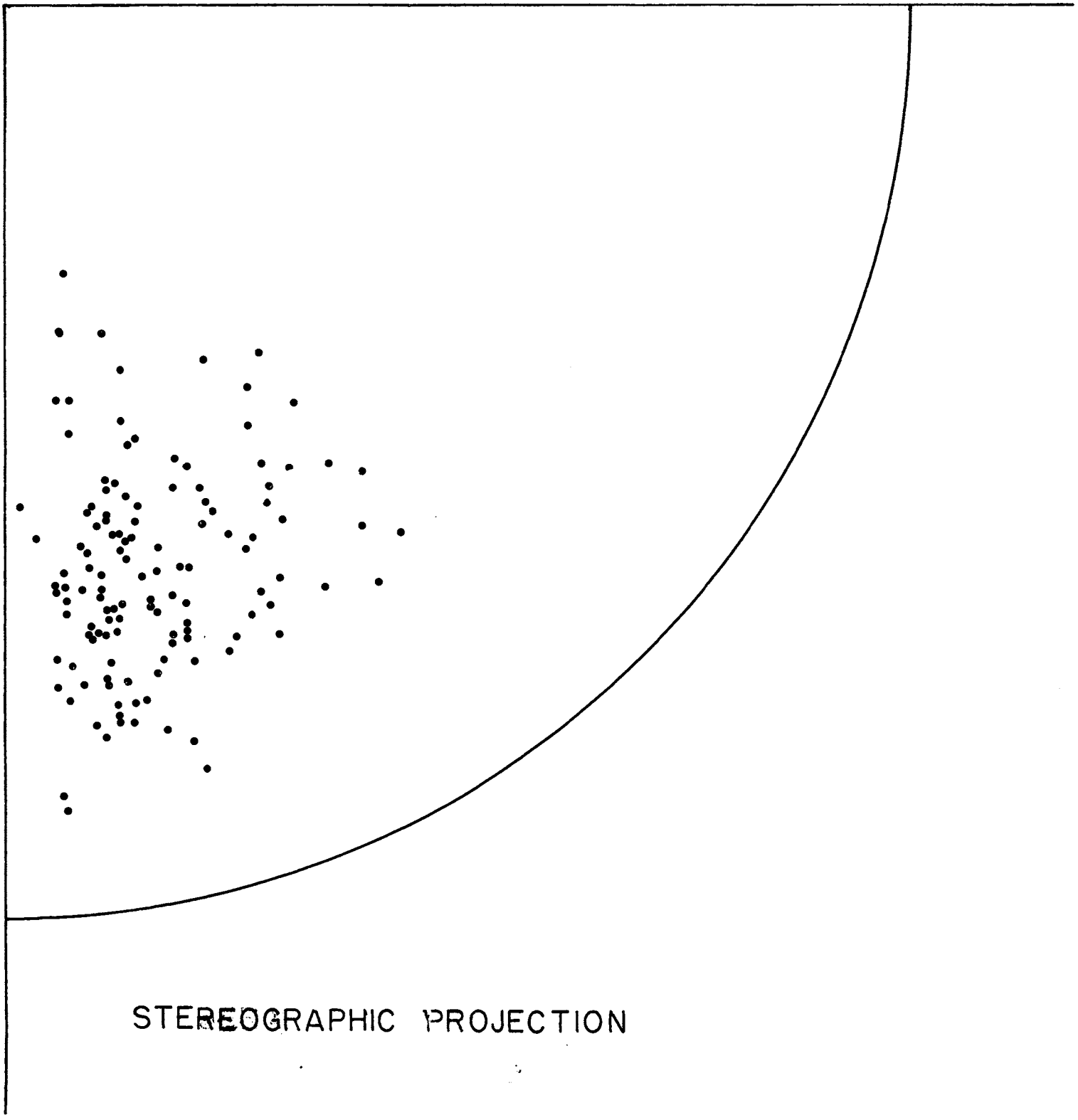
STEREOGRAPHIC PROJECTION

GRANITE



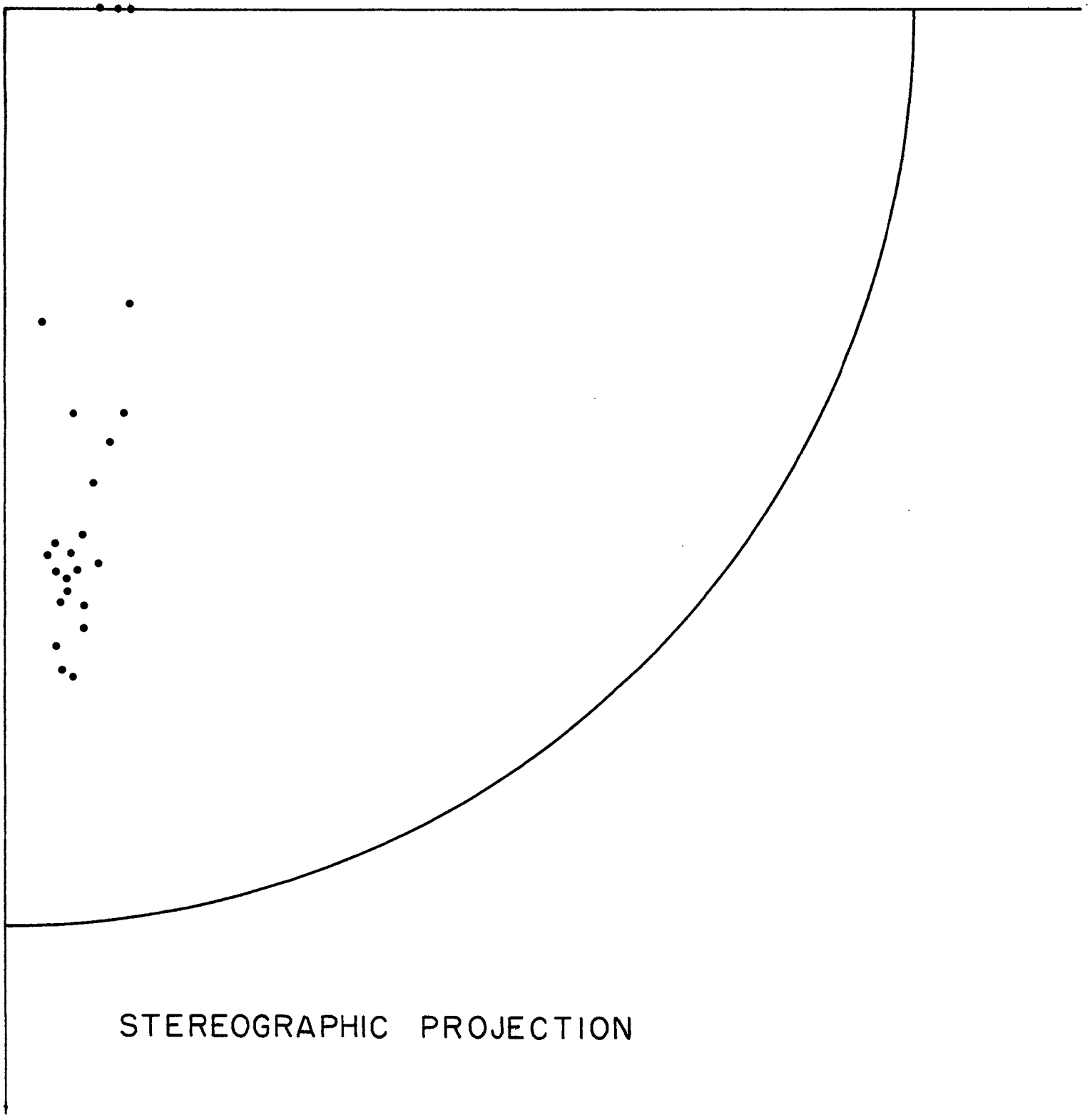
STEREOGRAPHIC PROJECTION

TRIASSICS



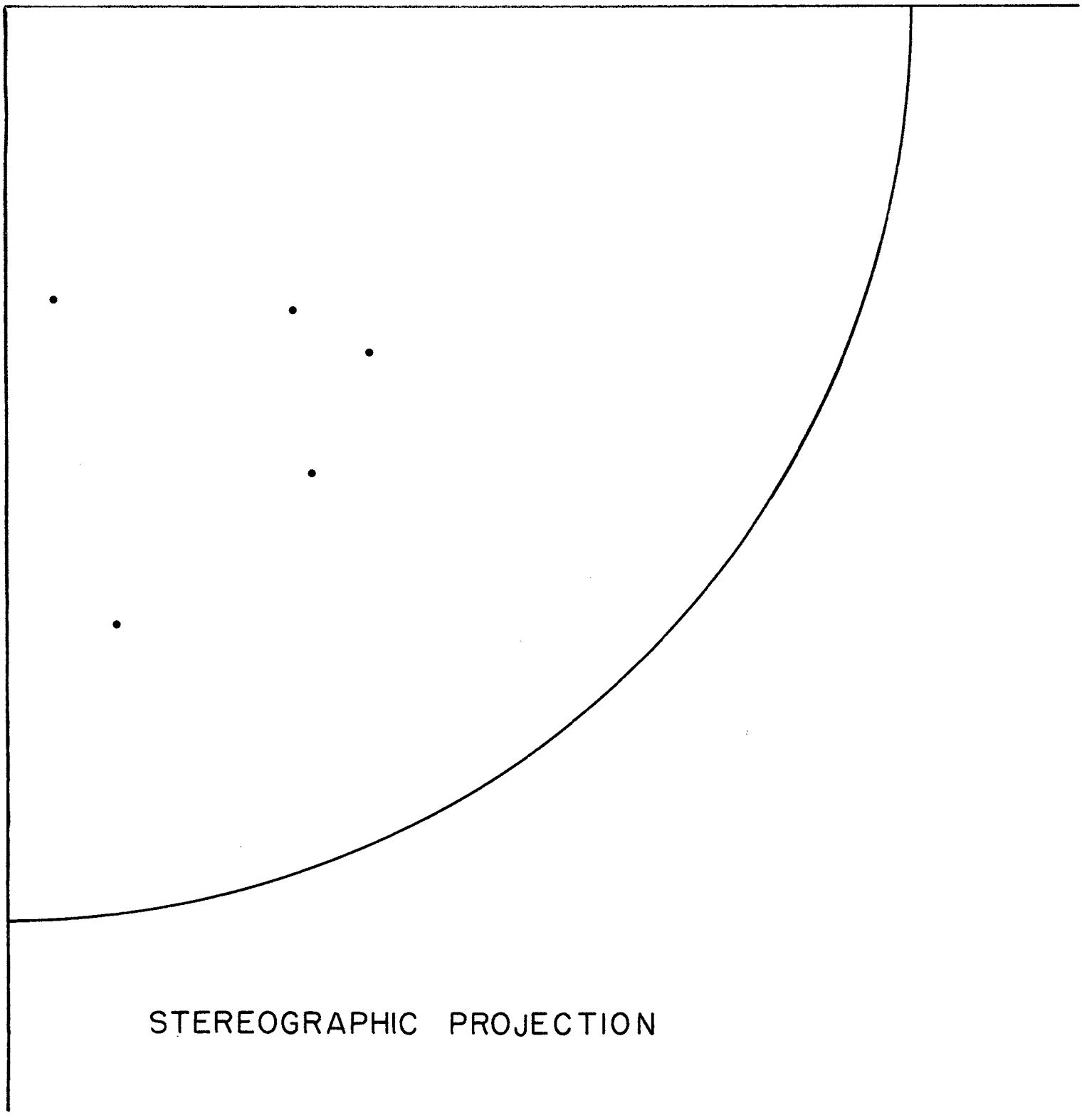
STEREOGRAPHIC PROJECTION

ALLUVIUM



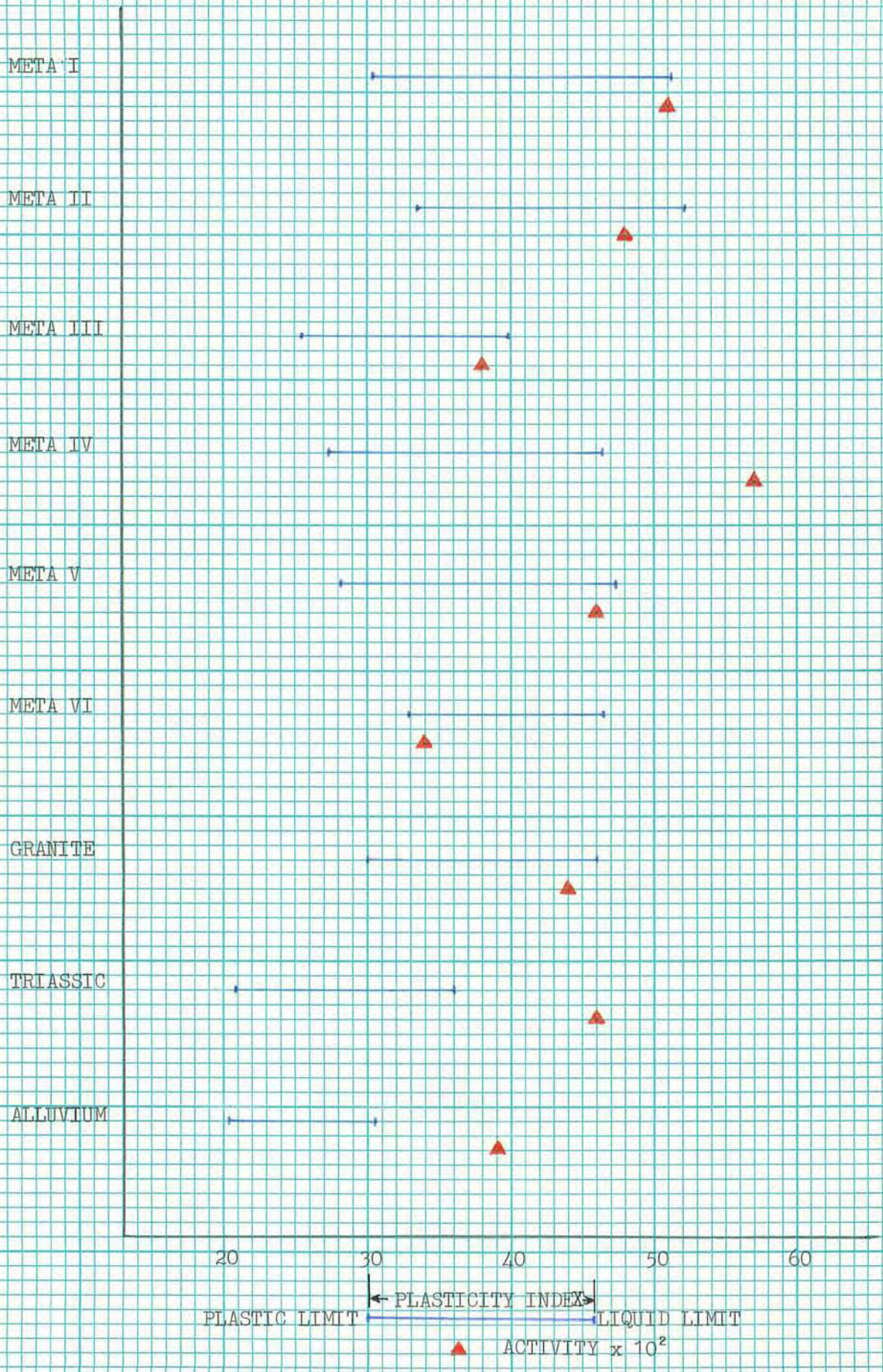
STEREOGRAPHIC PROJECTION

ULTRAMAFICS

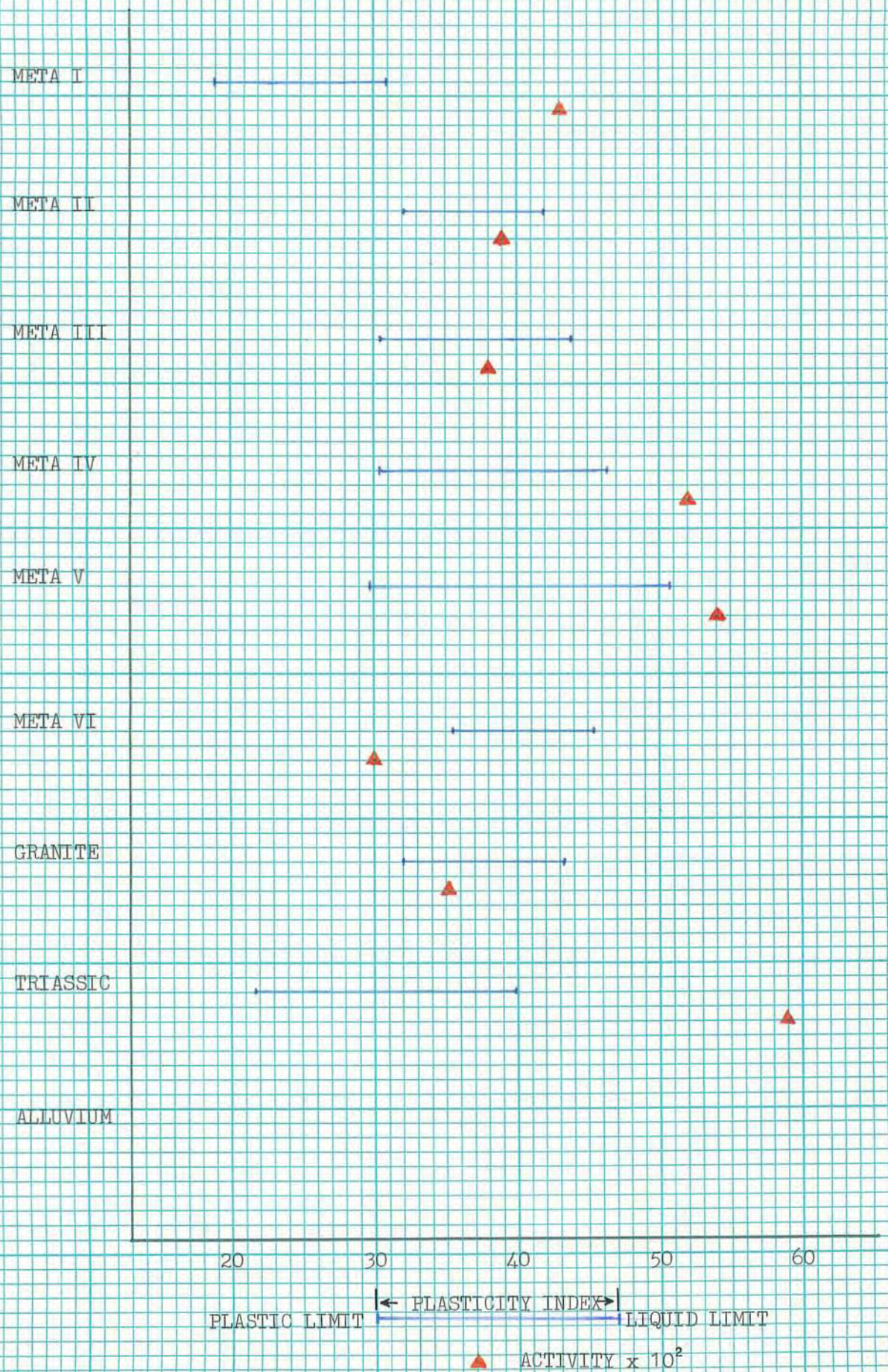


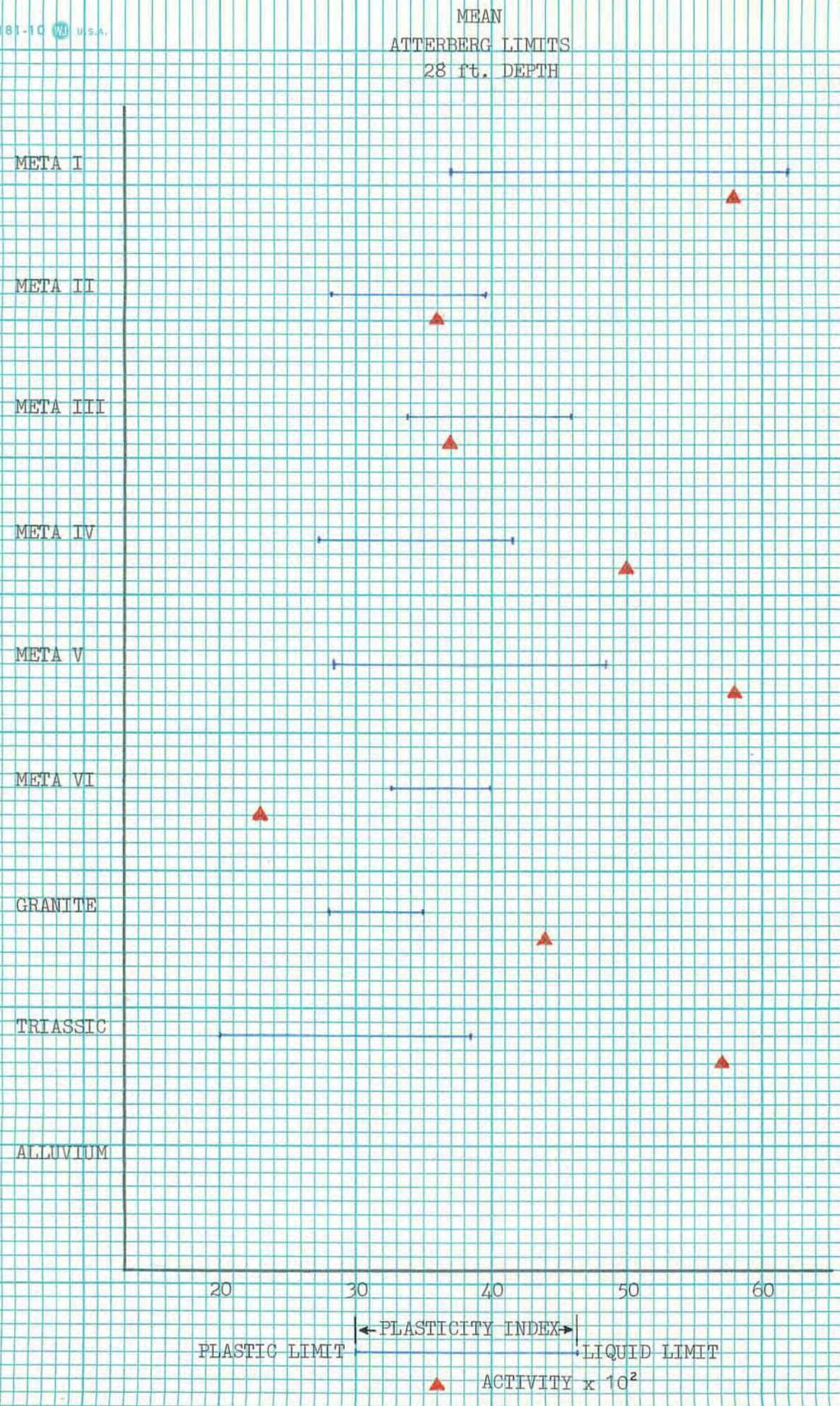
STEREOGRAPHIC PROJECTION

MEAN
ATTERBERG LIMITS
8 ft. DEPTH

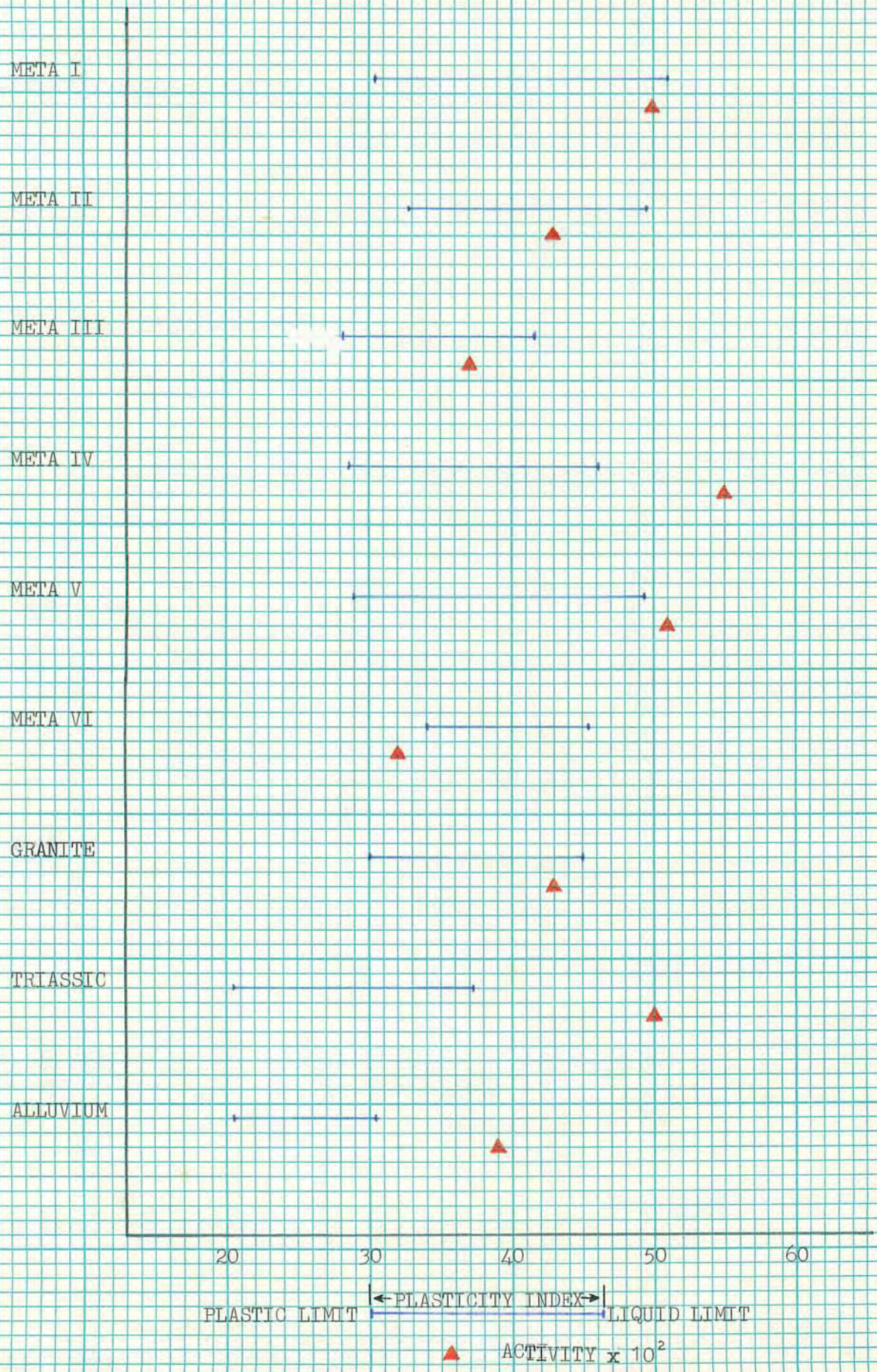


MEAN
ATTERBERG LIMITS
18 ft. DEPTH

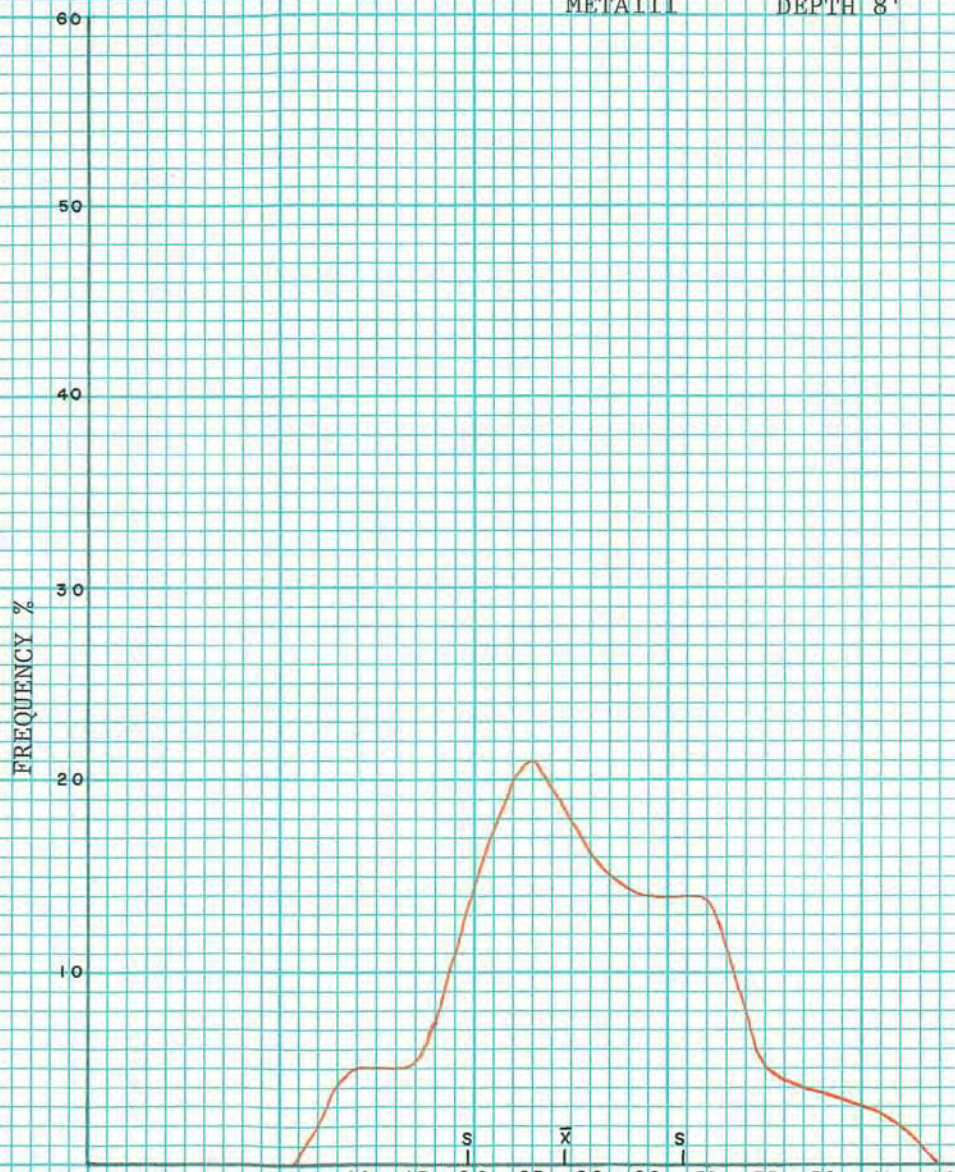




MEAN
ATTERBERG LIMITS
TOTAL



METAIII DEPTH 8' #SAMPLES 37

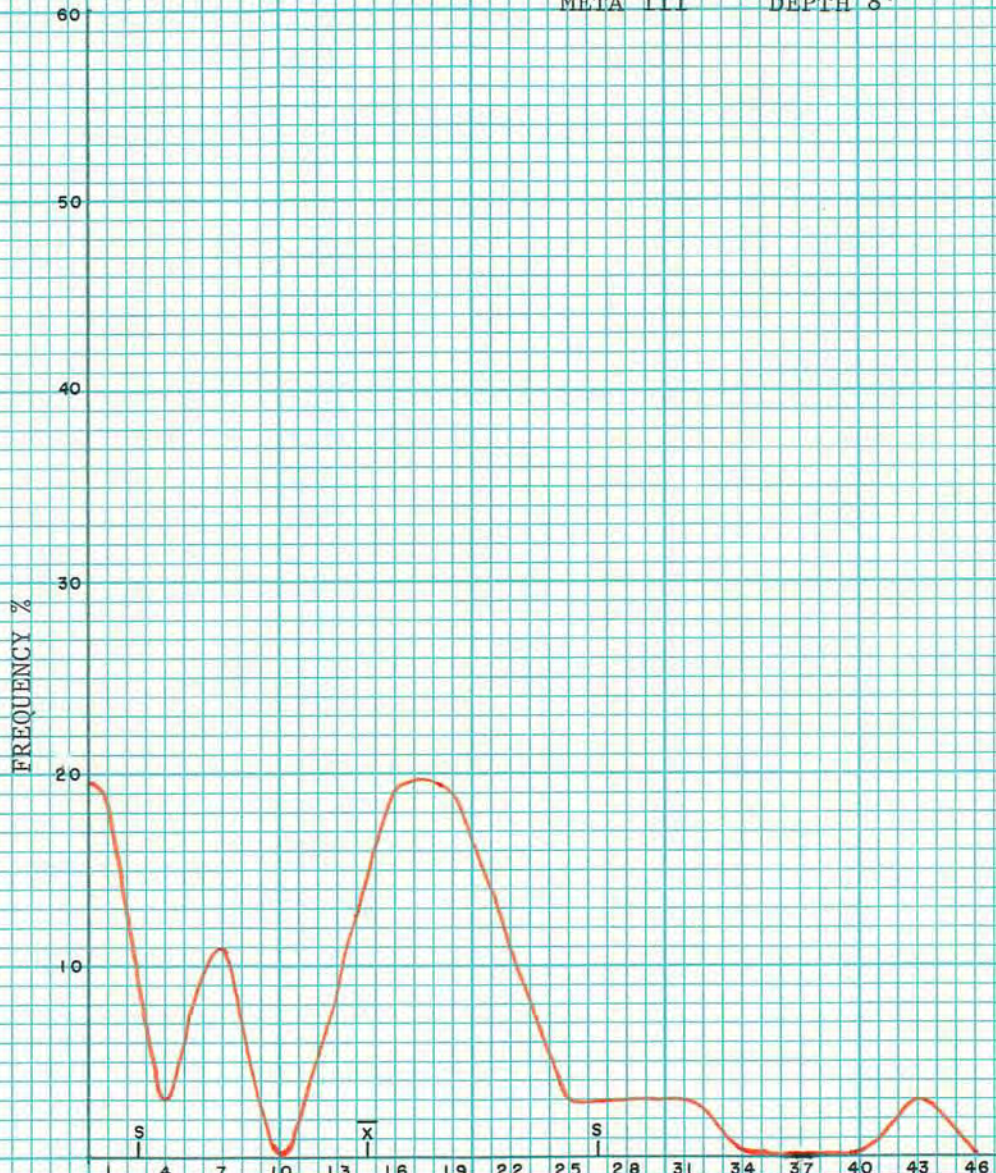


$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META III DEPTH 8' #SAMPLES

META III DEPTH 8' #SAMPLES 37



$\bar{x}$ =MEAN VALUE

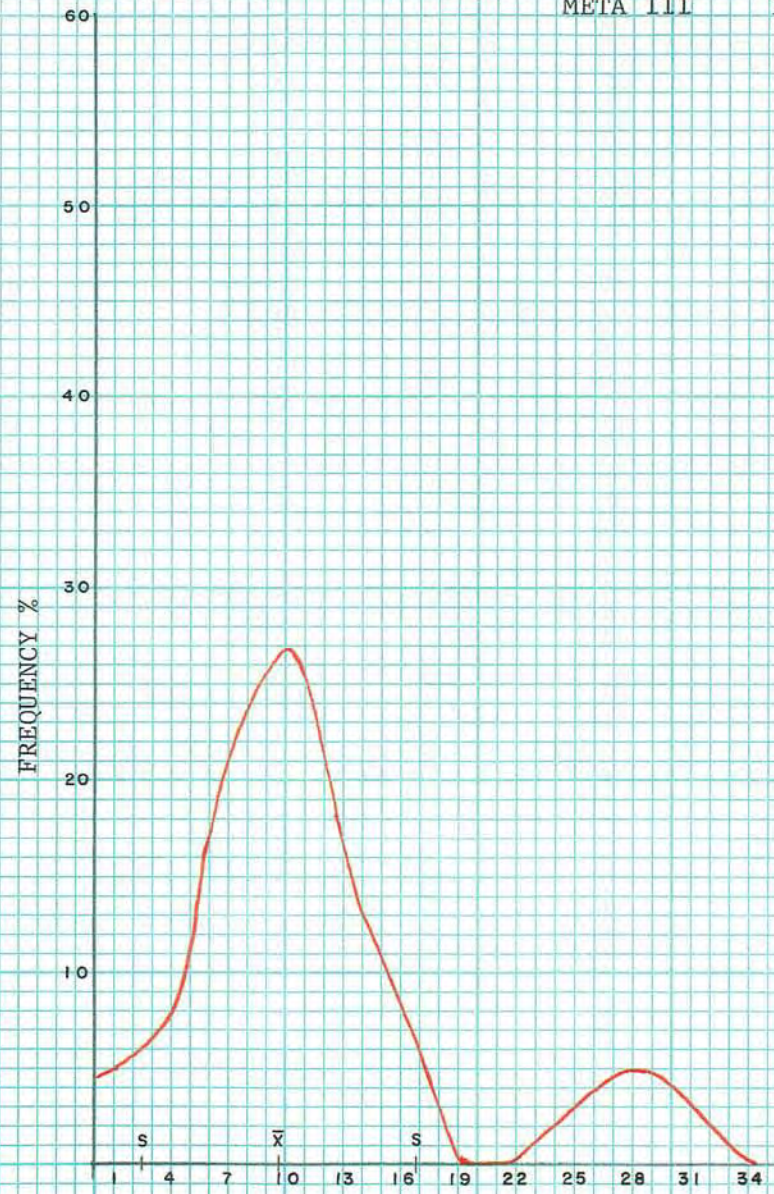
s =STANDARD DEVIATION

META III DEPTH 8' #SAMPLES 37

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META III DEPTH 8' #SAMPLES 37



COARSE SAND FRACTION

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META III DEPTH 8' #SAMPLES 37

FINE SAND FRACTION $\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META III DEPTH 8' #SAMPLES 37

$\bar{x}$=MEAN VALUE

s=STANDARD DEVIATION

META III DEPTH 8' #SAMPLES 37

META IV DEPTH 8' #SAMPLES 83

META IV DEPTH 8' #SAMPLES 83

x̄=MEAN VALUE

s=STANDARD DEVIATION

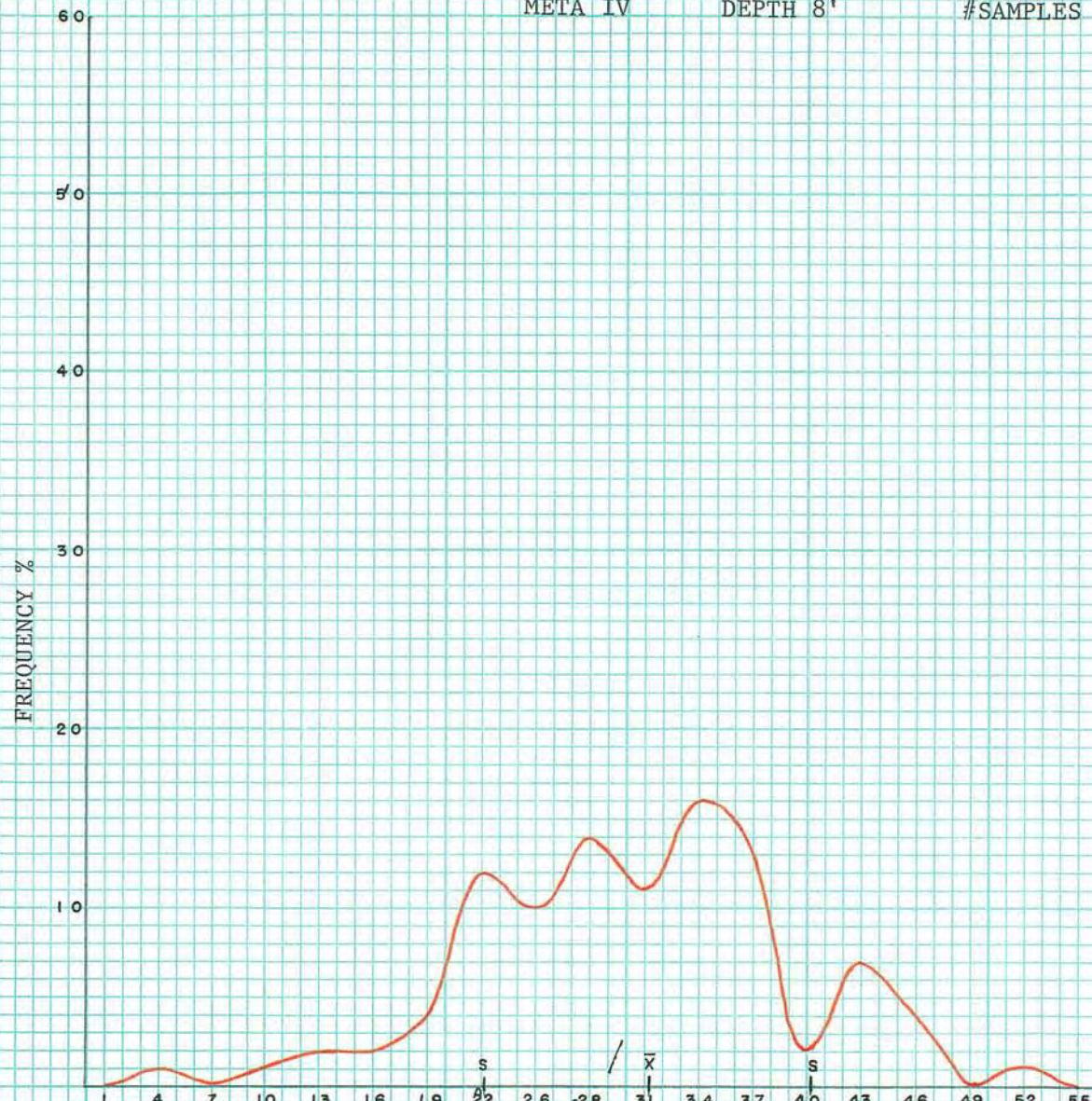

META IV DEPTH 8' #SAMPLES 83
60
50
40
30
20
10
FREQUENCY %
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43
s
x̄
s
PLASTICITY INDEX
x̄ =MEAN VALUE
s =STANDARD DEVIATION

META IV DEPTH 8' #SAMPLES 83

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META IV DEPTH 8' #SAMPLES 83



COARSE SAND FRACTION $\bar{x}$ =MEAN VALUE

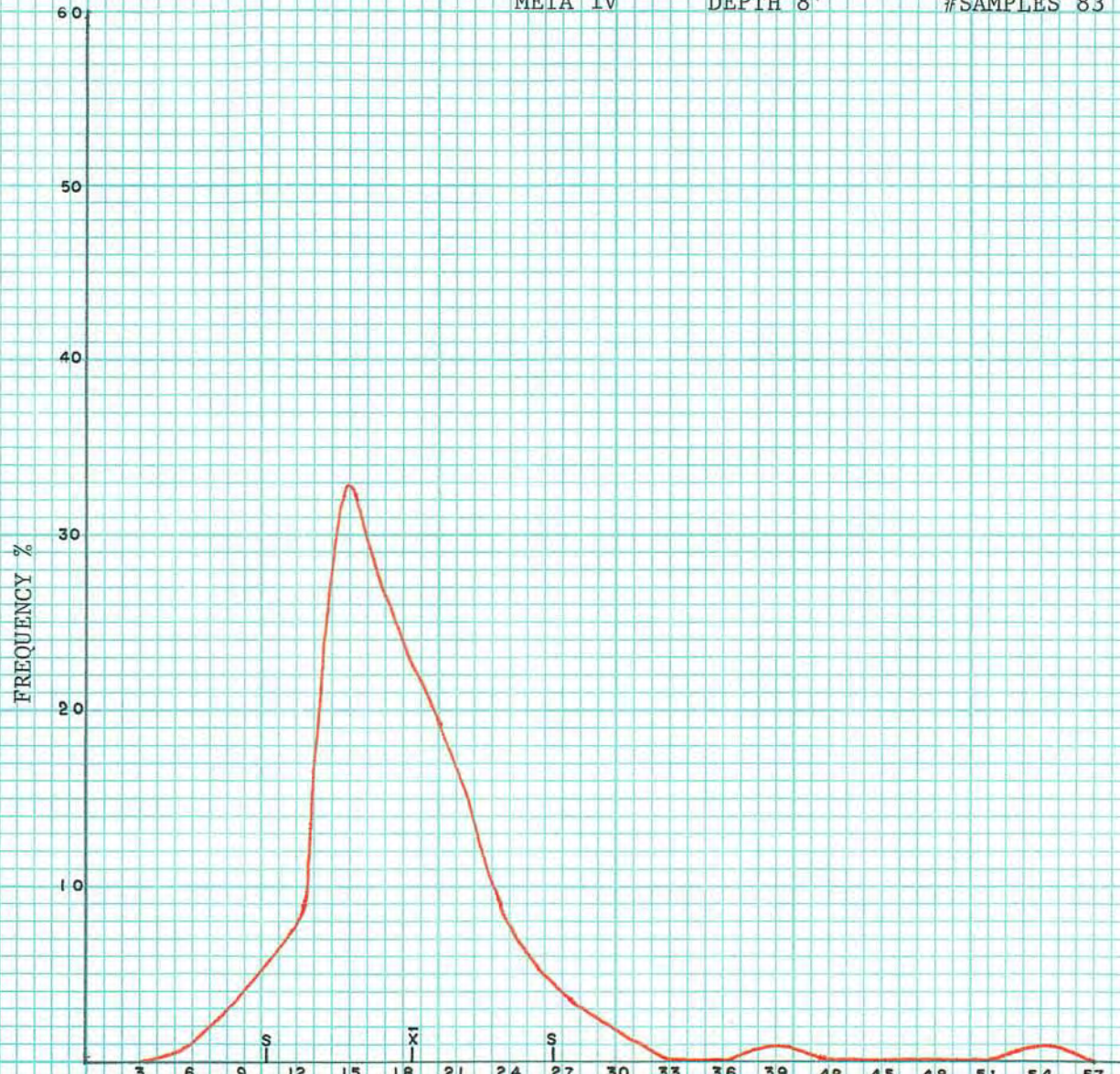
s =STANDARD DEVIATION

META IV DEPTH 8' #SAMPLES 83

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

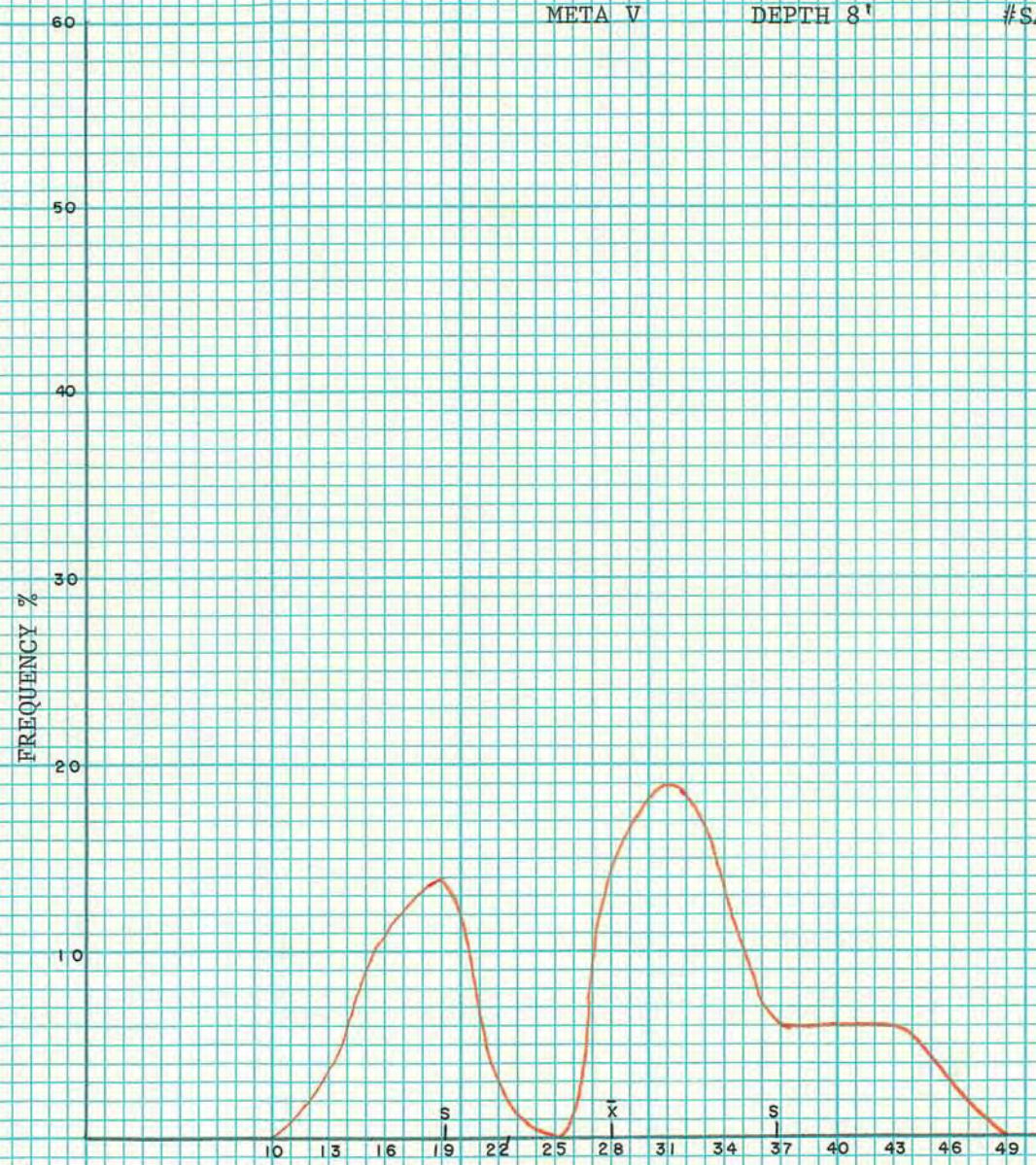
META IV DEPTH 8' #SAMPLES 83



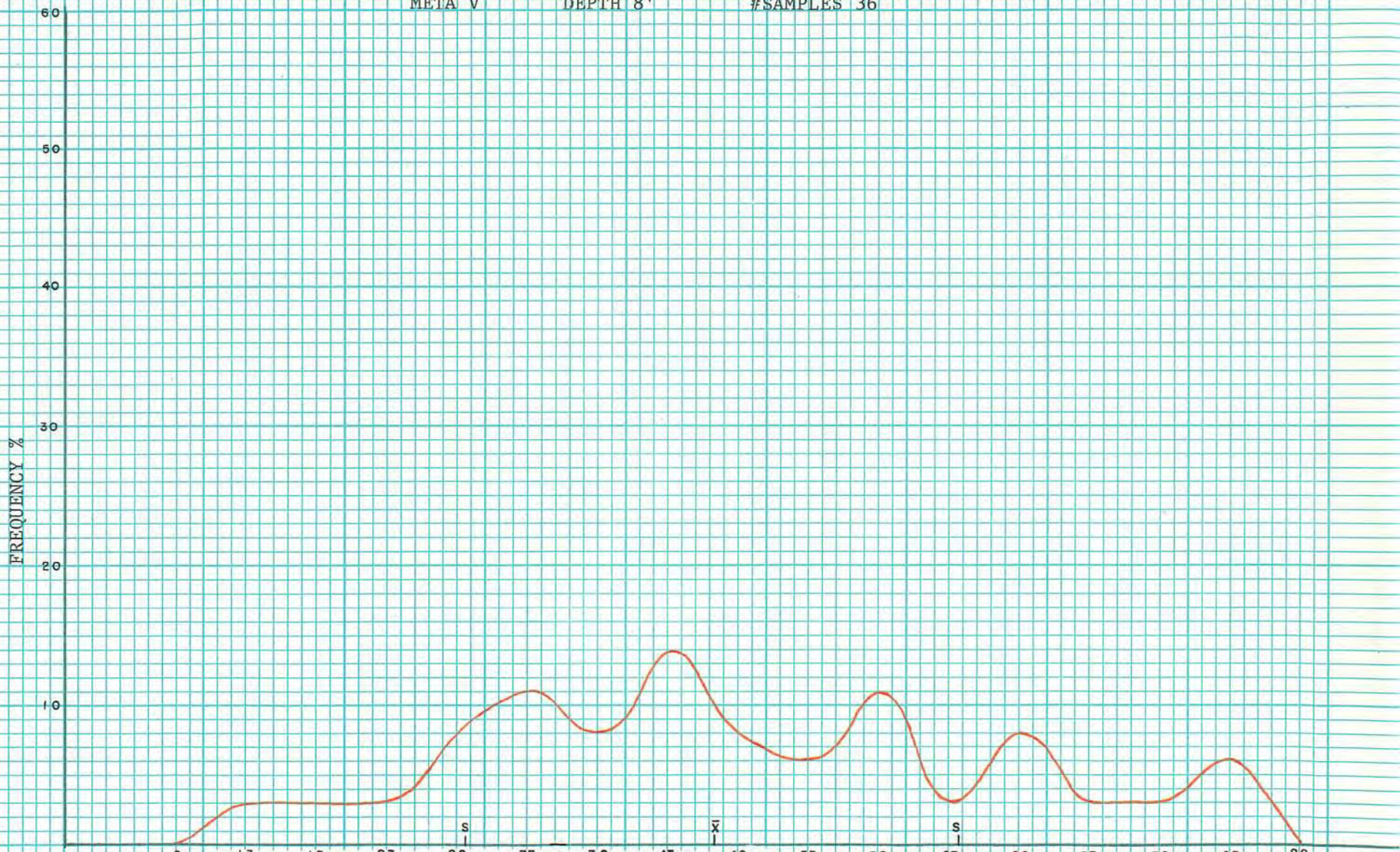
$\bar{x}$ =MEAN VALUE

s=STANDARD DEVIATION

META IV DEPTH 8' #SAMPLES 83



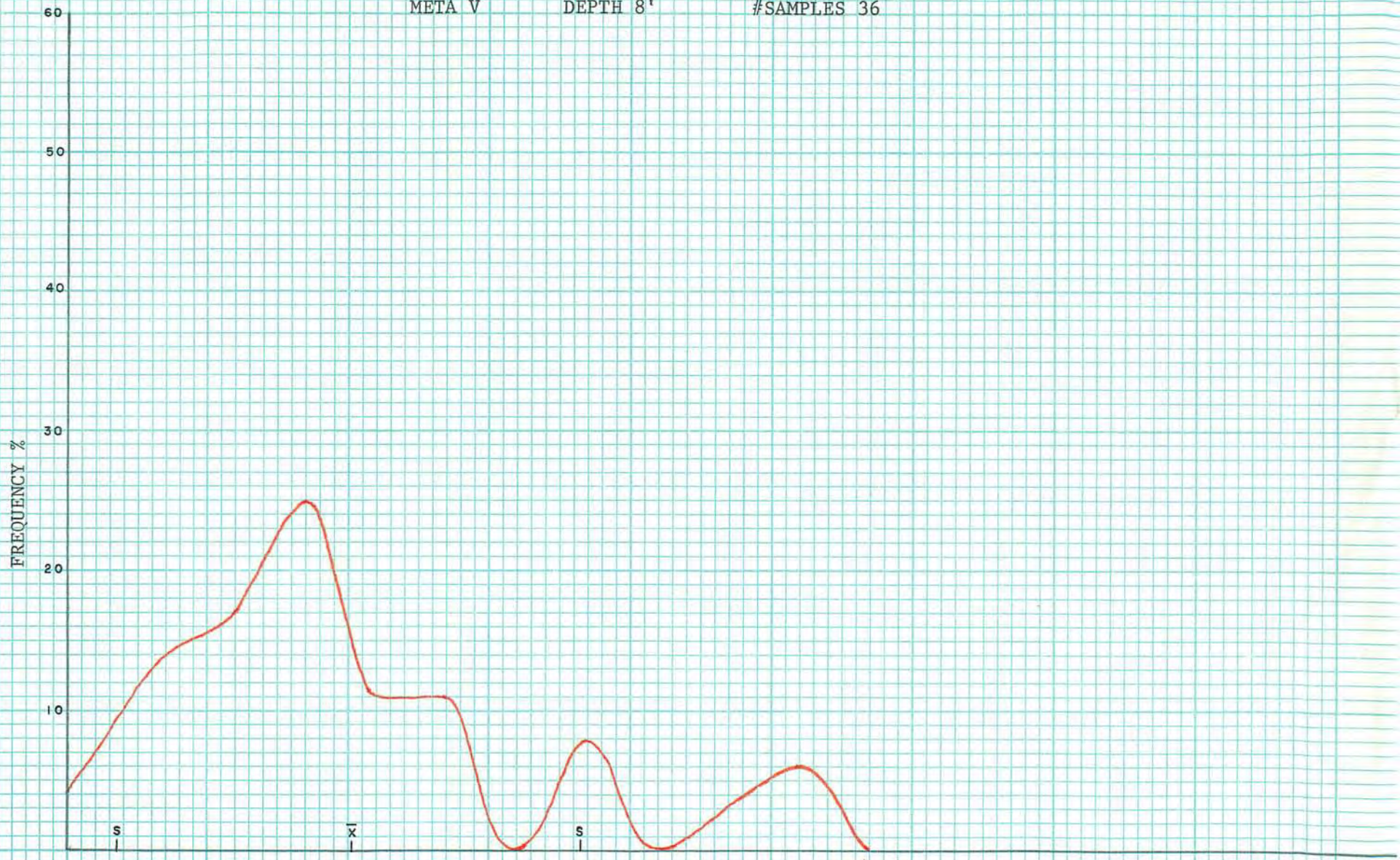
META V DEPTH 8' #SAMPLES 36



$\bar{x}$=MEAN VALUE

s=STANDARD DEVIATION

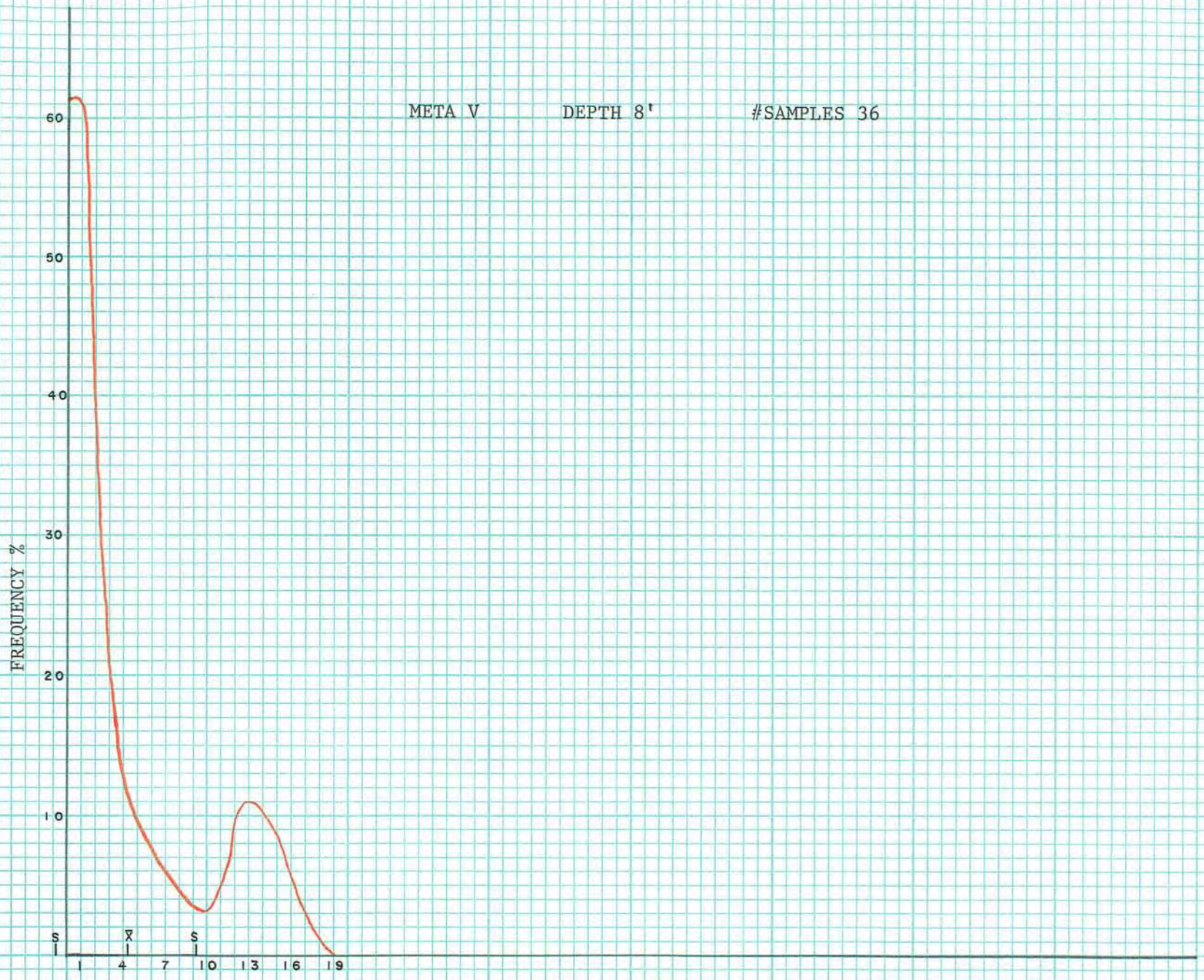
META V DEPTH 8' #SAMPLES 36



$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META V DEPTH 8' #SAMPLES 36



COARSE AGGREGATE FRACTION

$\bar{x}$ =MEAN VALUE

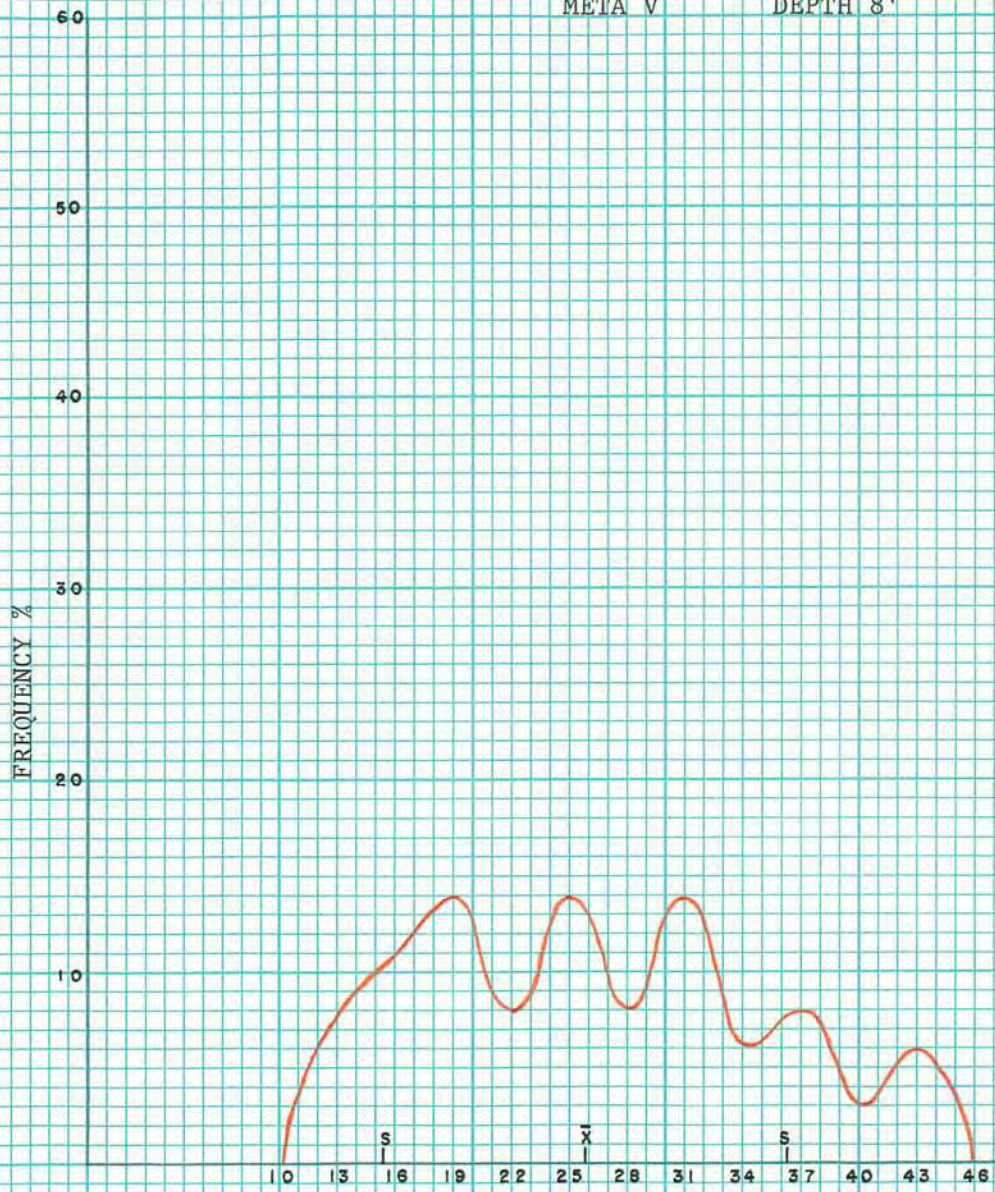
s =STANDARD DEVIATION

META V DEPTH 8' #SAMPLES 36

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

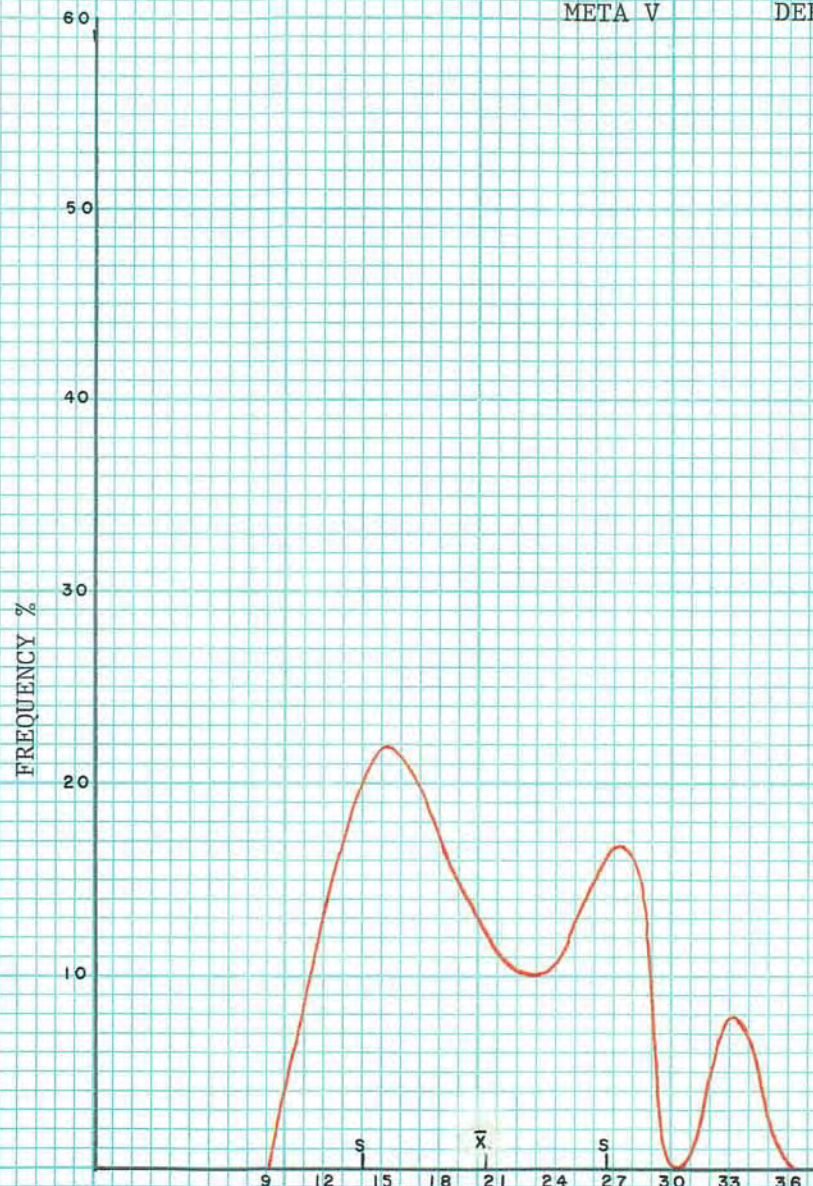
META V DEPTH 8' #SAMPLES 36



X̄ =MEAN VALUE

s =STANDARD DEVIATION

META V DEPTH 8' #SAMPLES 36



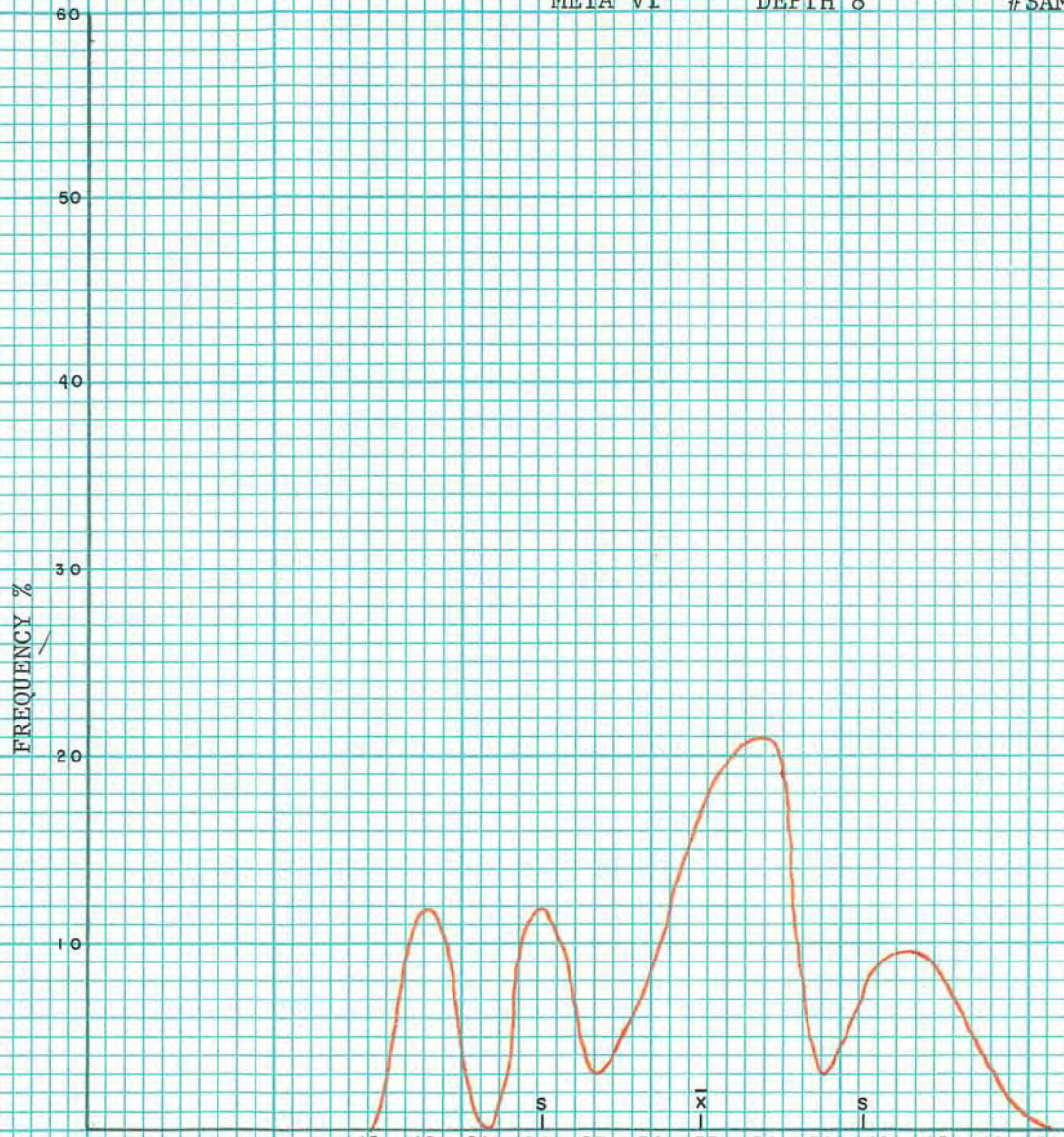
$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META IV DEPTH 8' #SAMPLES 36

$\bar{x}$=MEAN VALUE
s=STANDARD DEVIATION

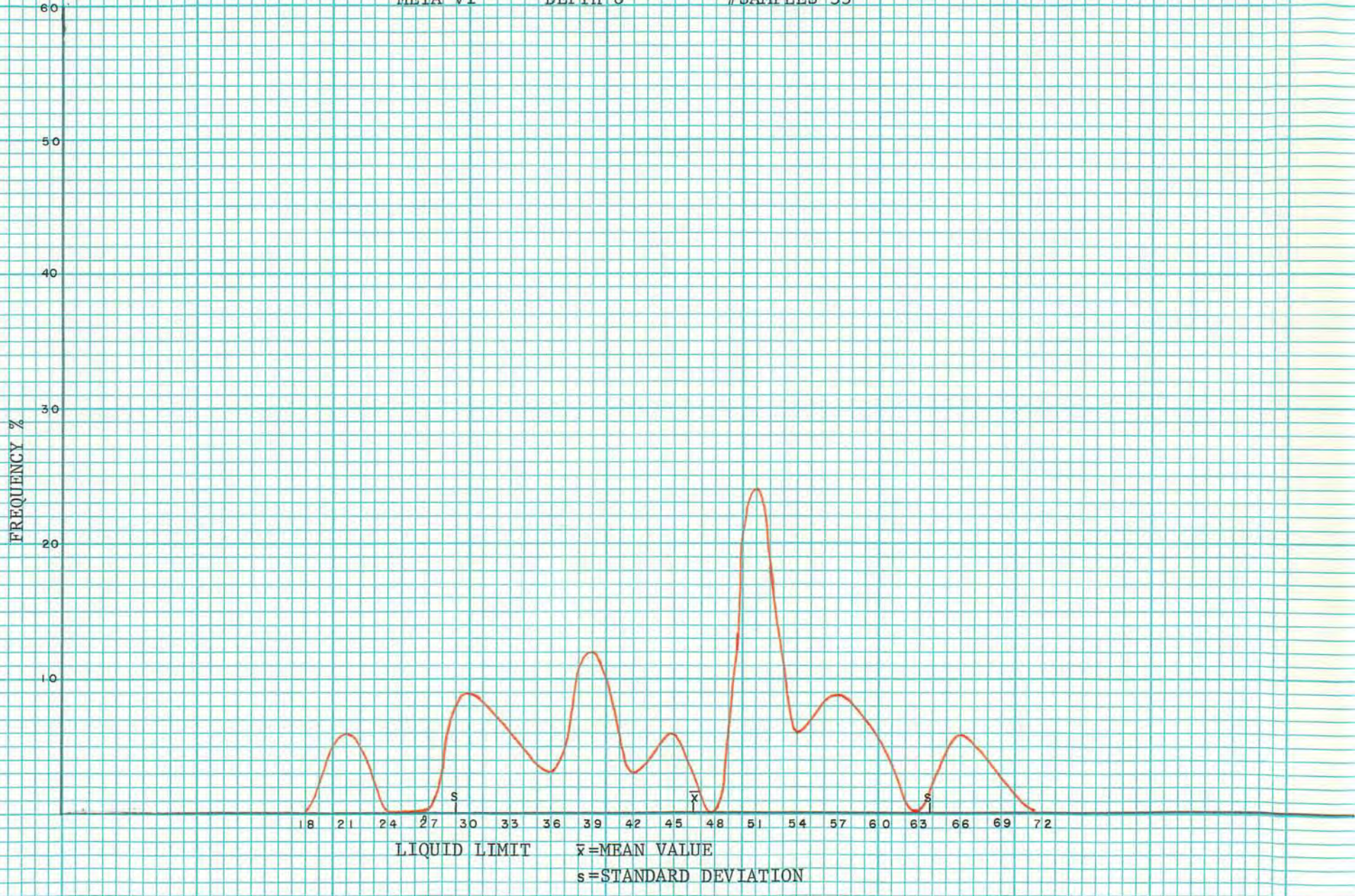
META VI DEPTH 8' #SAMPLES 33



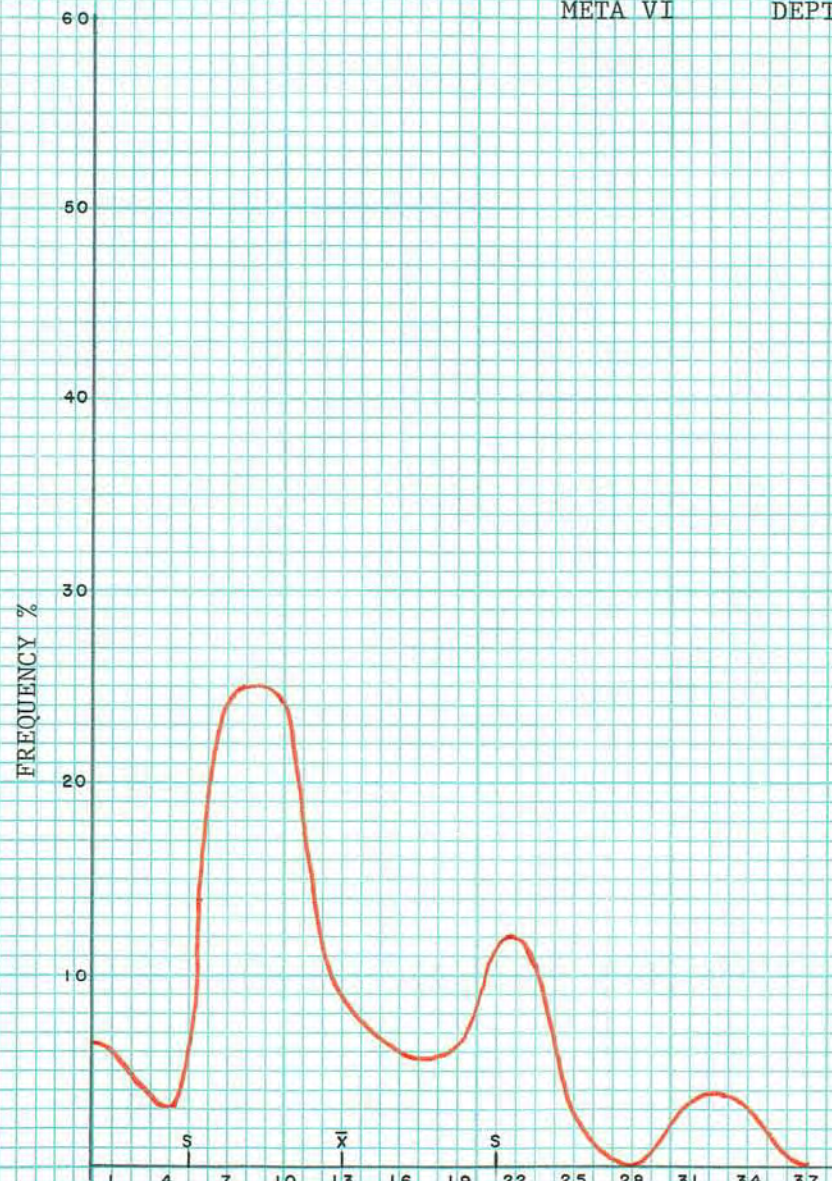
$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

FORM 7181-10 U.S.A.


META VI DEPTH 8' #SAMPLES 33
FREQUENCY %
60
50
40
30
20
10
S
$\bar{x}$
S
18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72
LIQUID LIMIT
$\bar{x}$=MEAN VALUE
s=STANDARD DEVIATION

META VI DEPTH 8' #SAMPLES 33



$\bar{x}$ =MEAN VALUE

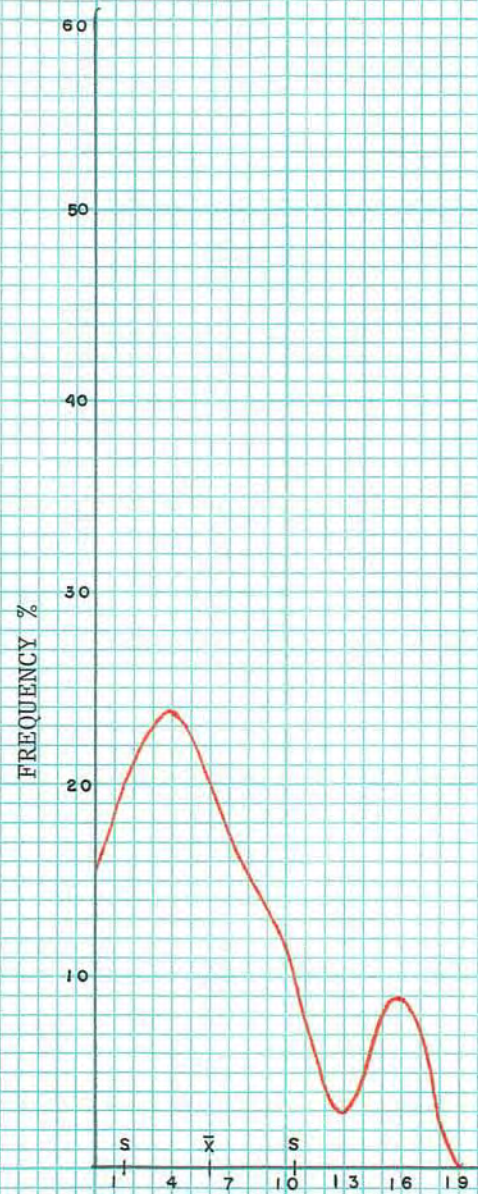
s =STANDARD DEVIATION

META VI DEPTH 8' #SAMPLES 33

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META VI DEPTH 8' #SAMPLES 33



COARSE SAND FRACTION

$\bar{x}$ = MEAN VALUE

s = STANDARD DEVIATION

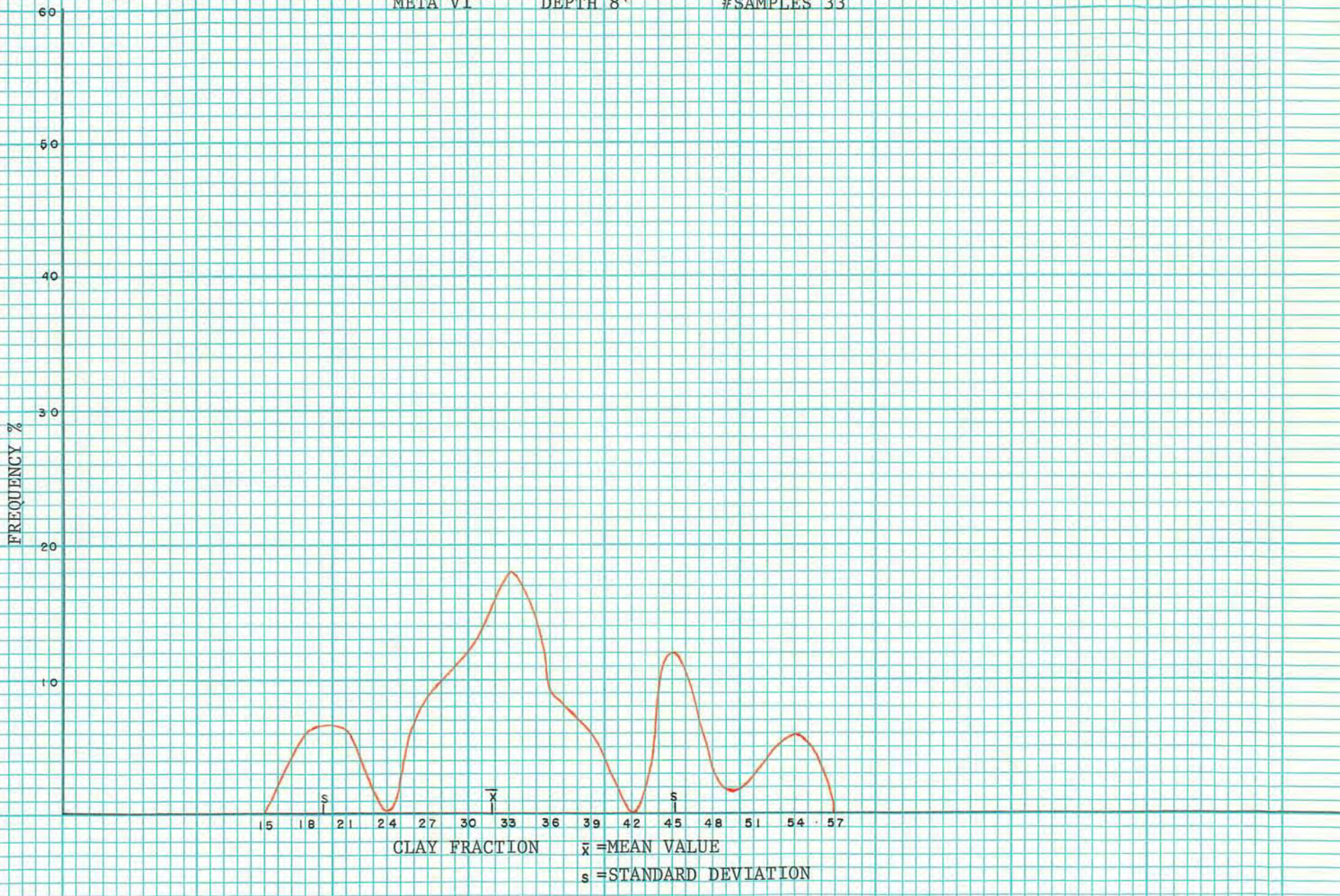
META VI DEPTH 8' #SAMPLES 33

FINE SAND FRACTION

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

META VI DEPTH 8' #SAMPLES 33

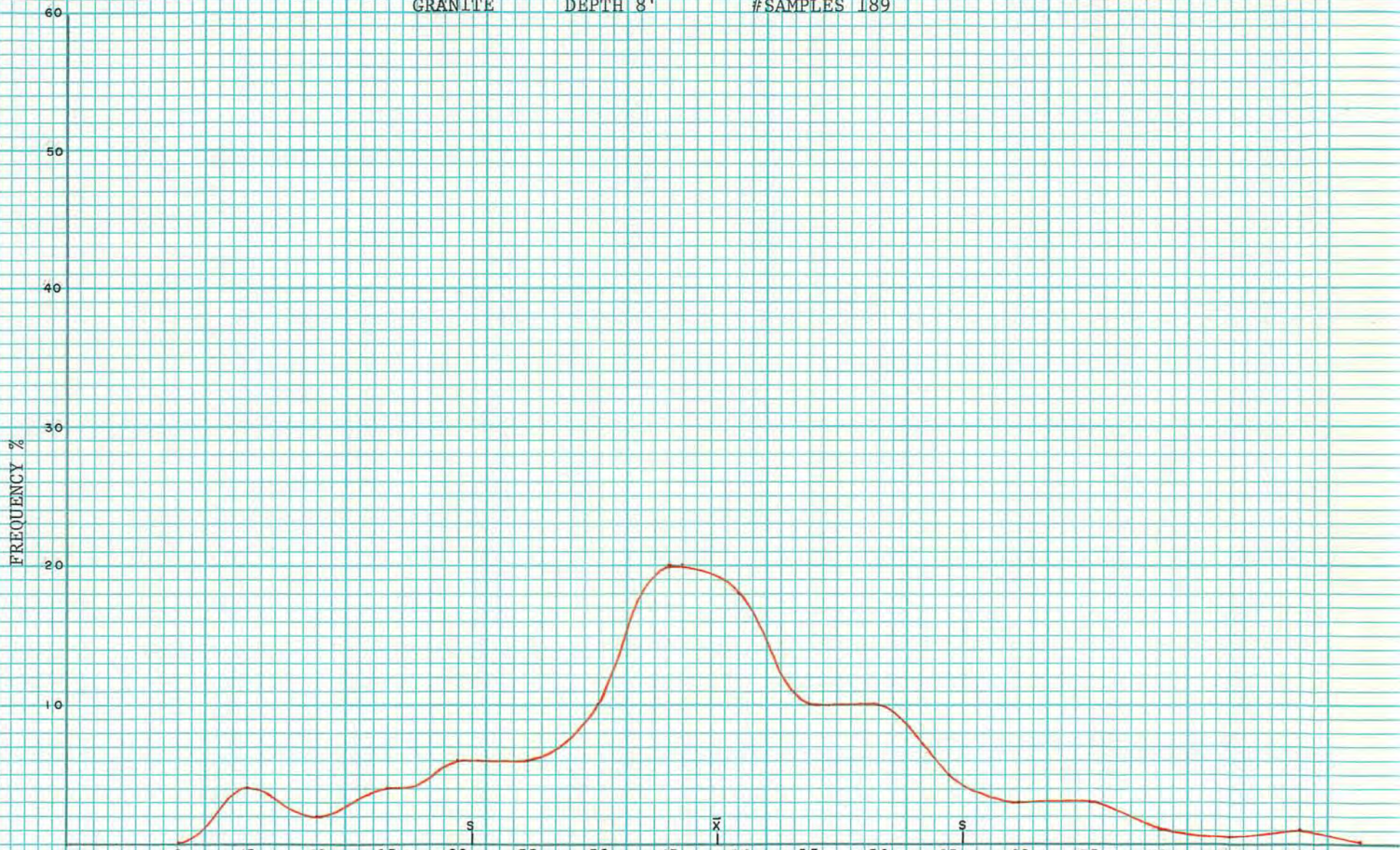

META VI DEPTH 8' #SAMPLES 33
FREQUENCY %
60
50
40
30
20
10
S
X̄
S
15 18 21 24 27 30 33 36 39 42 45 48 51 54 57
CLAY FRACTION
X̄ =MEAN VALUE
S =STANDARD DEVIATION

GRANITE DEPTH 8' #SAMPLES 189

PLASTIC LIMIT $\bar{x}$=MEAN VALUE

s=STANDARD DEVIATION

GRANITE DEPTH 8' #SAMPLES 189



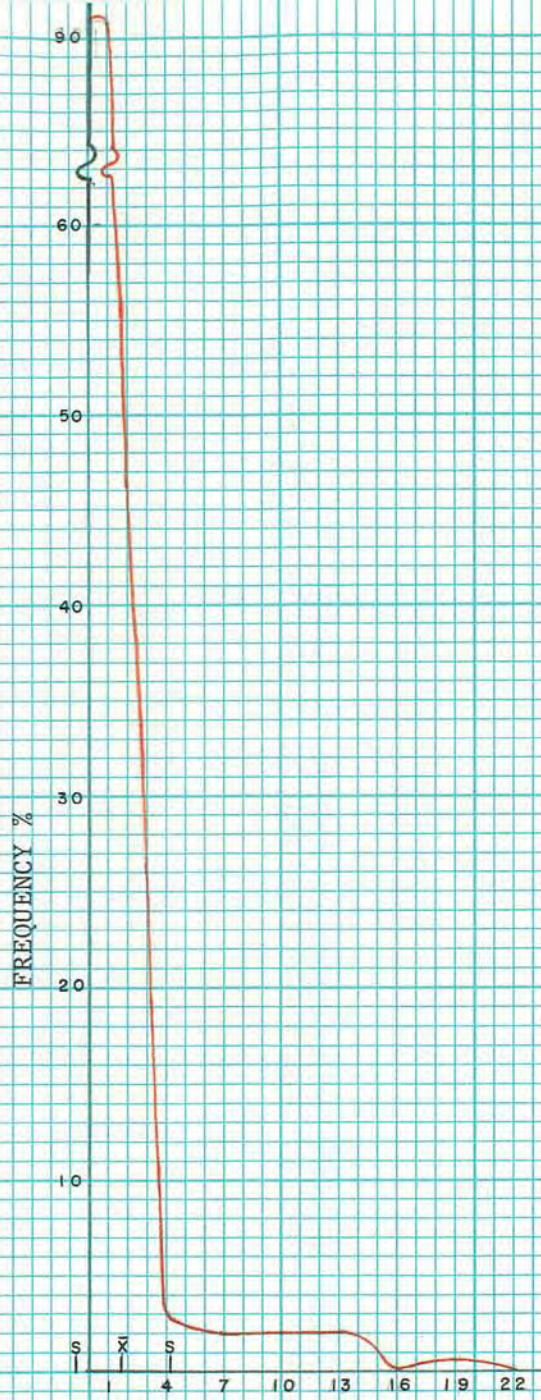
$\bar{x}$=MEAN VALUE

s =STANDARD DEVIATION

GRANITE DEPTH 8' #SAMPLES 189

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION



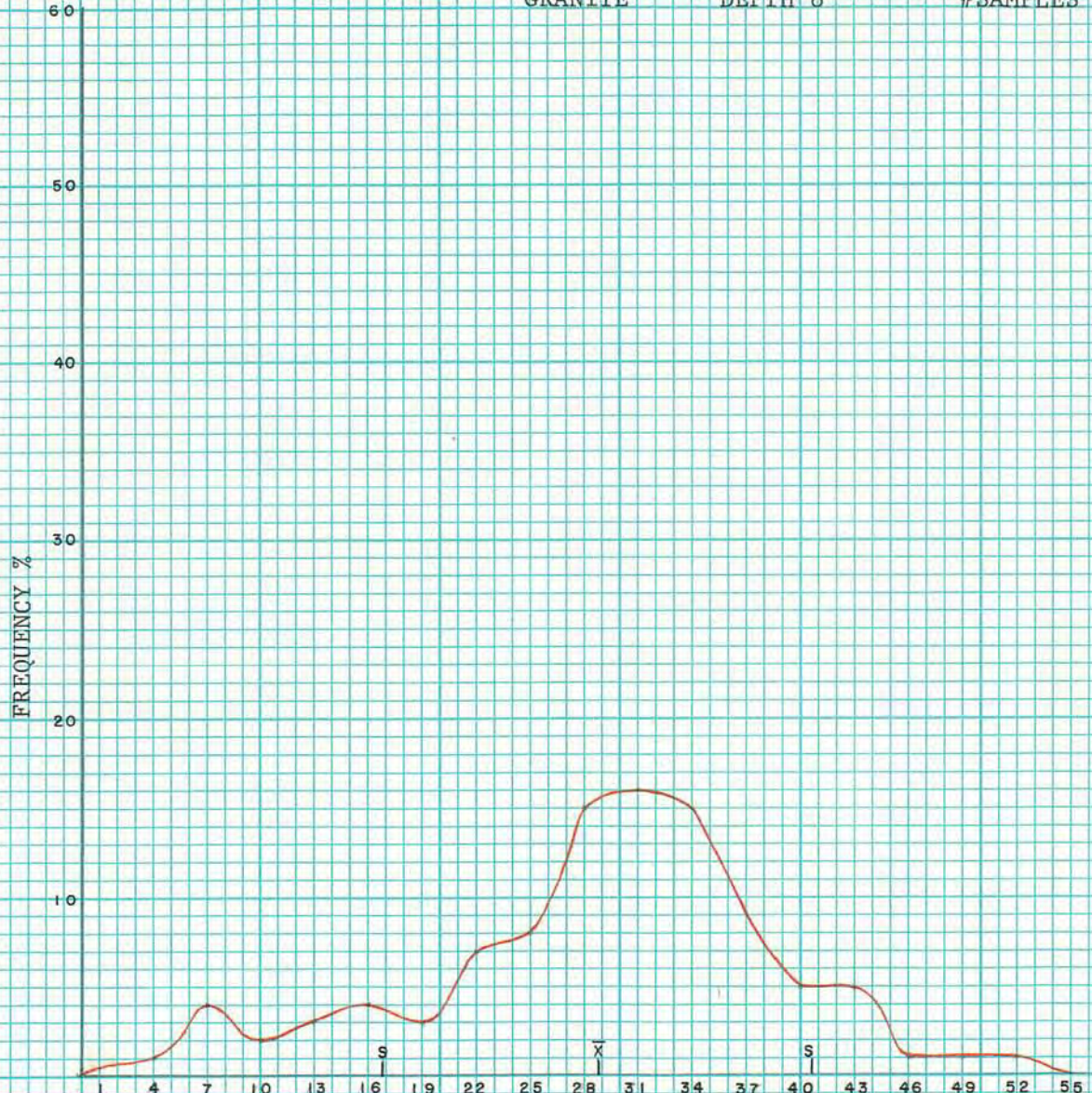
GRANITE DEPTH8' #SAMPLES 189

COARSE AGGREGATE FRACTION

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

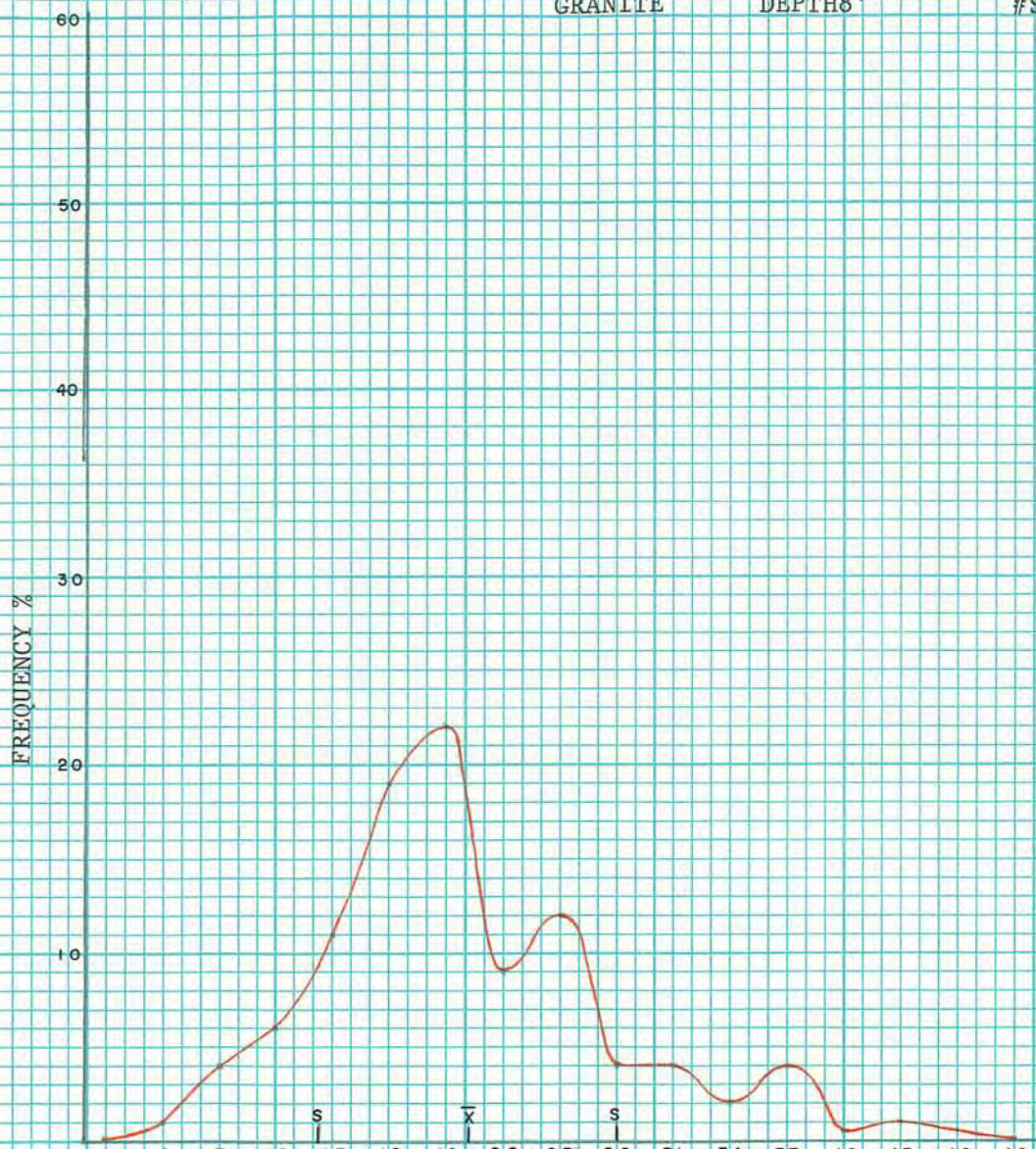
GRANITE DEPTH 8' #SAMPLES 189



$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

GRANITE DEPTH8' #SAMPLES 189



FINE SAND FRACTION $\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

GRANITE DEPTH 8' #SAMPLES 189

$\bar{x}$ =MEAN VALUE

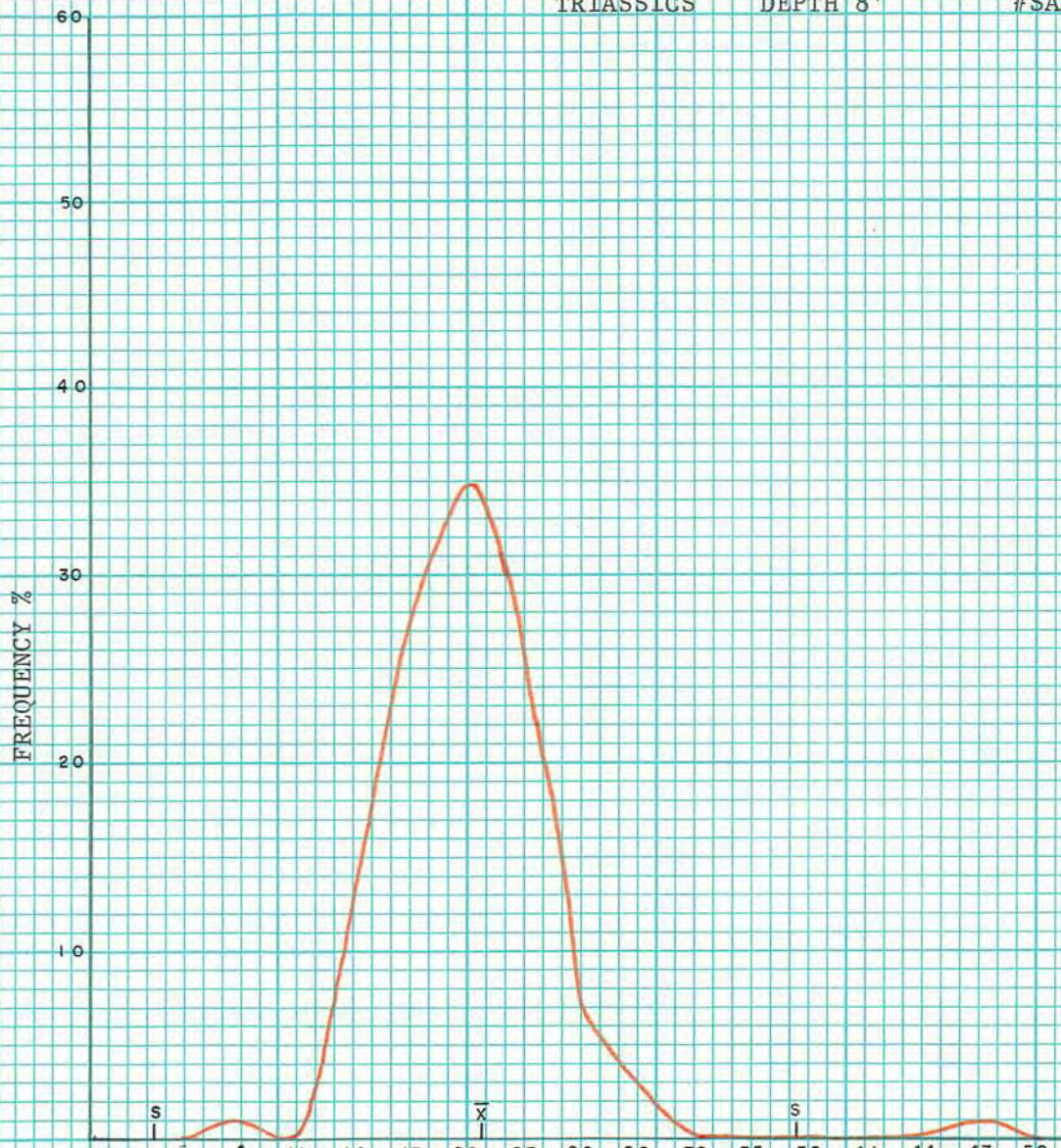
s =STANDARD DEVIATION

GRANITE DEPTH 8' #SAMPLES 189

$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

TRIASSICS DEPTH 8' #SAMPLES 86

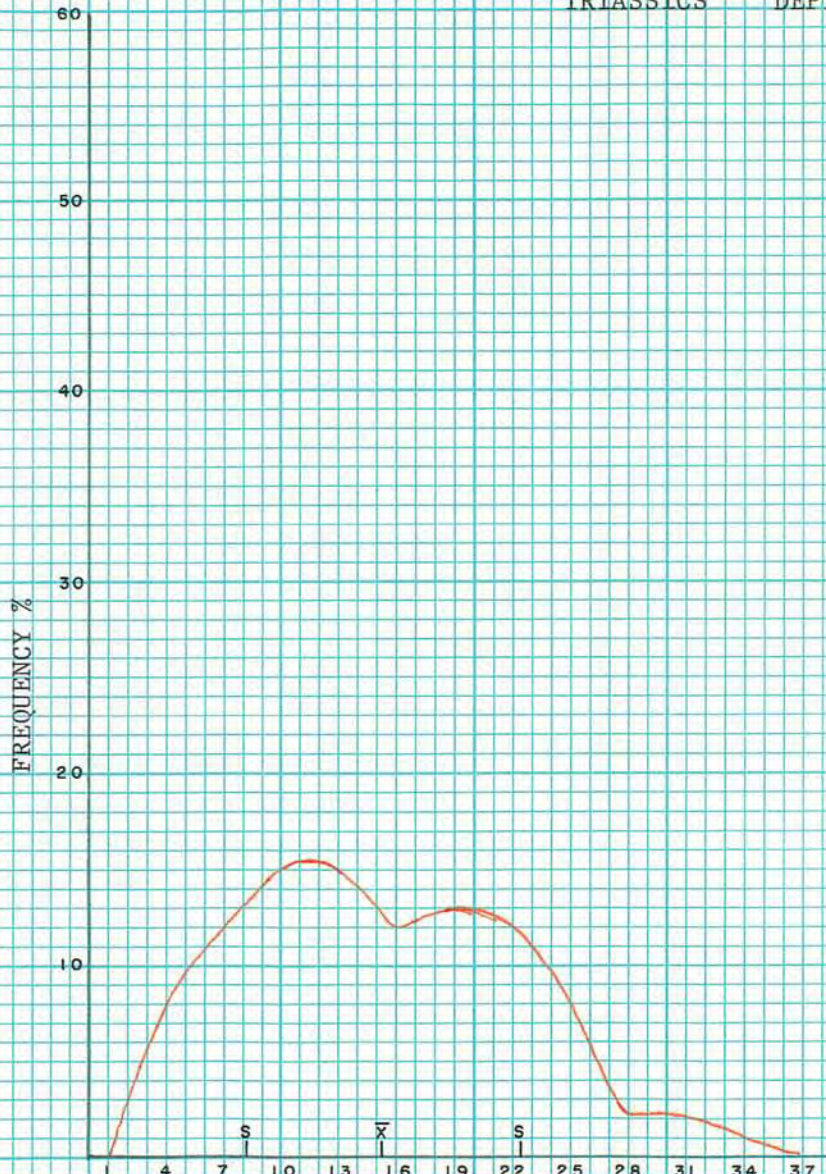


$\bar{x}$ =MEAN VALUE

s =STANDARD DEVIATION

TRIASSICS DEPTH 8' #SAMPLES 86

TRIASSICS DEPTH 8' #SAMPLES 86



$\bar{x}$ =MEAN VALUE
s =STANDARD DEVIATION

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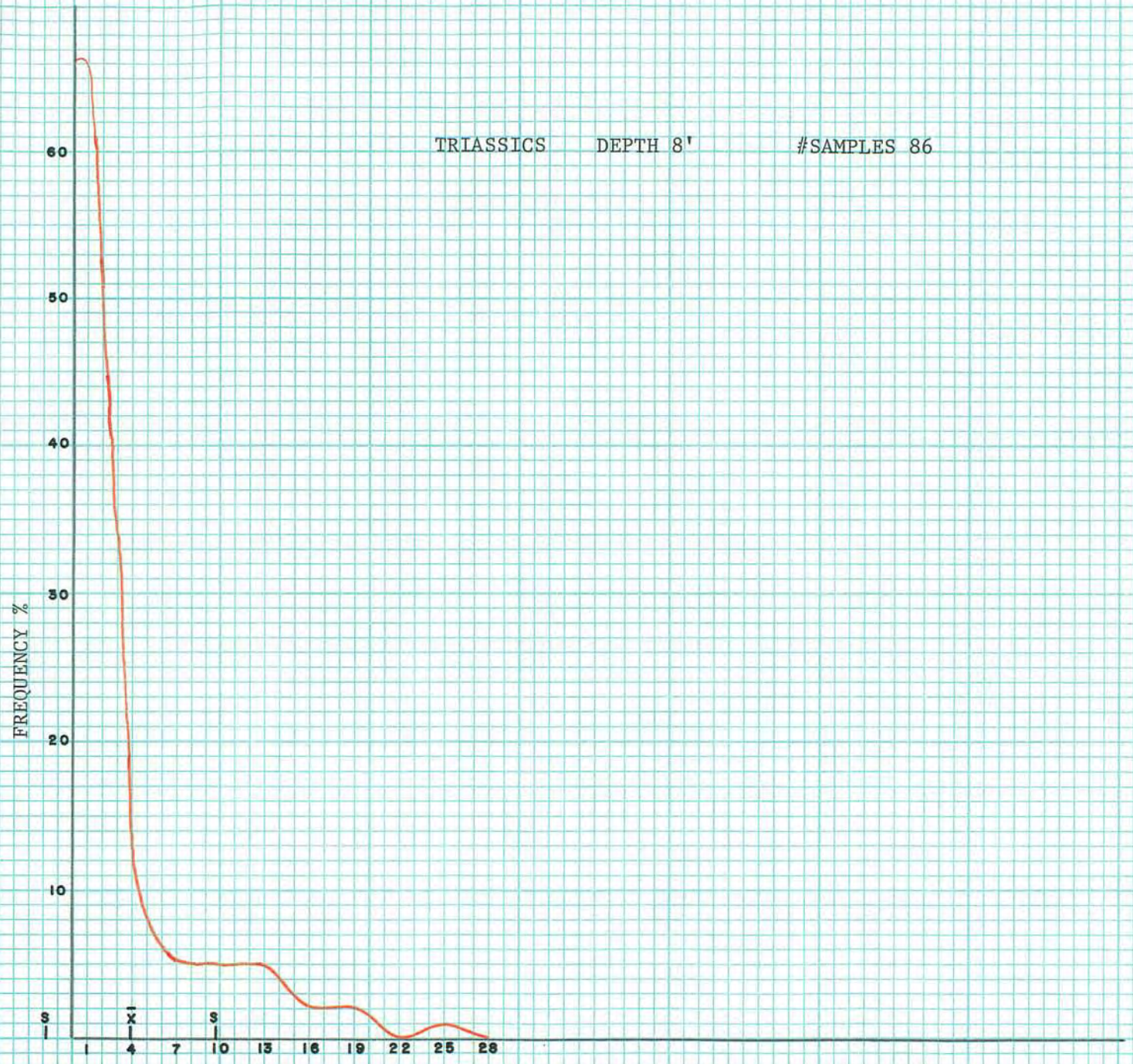

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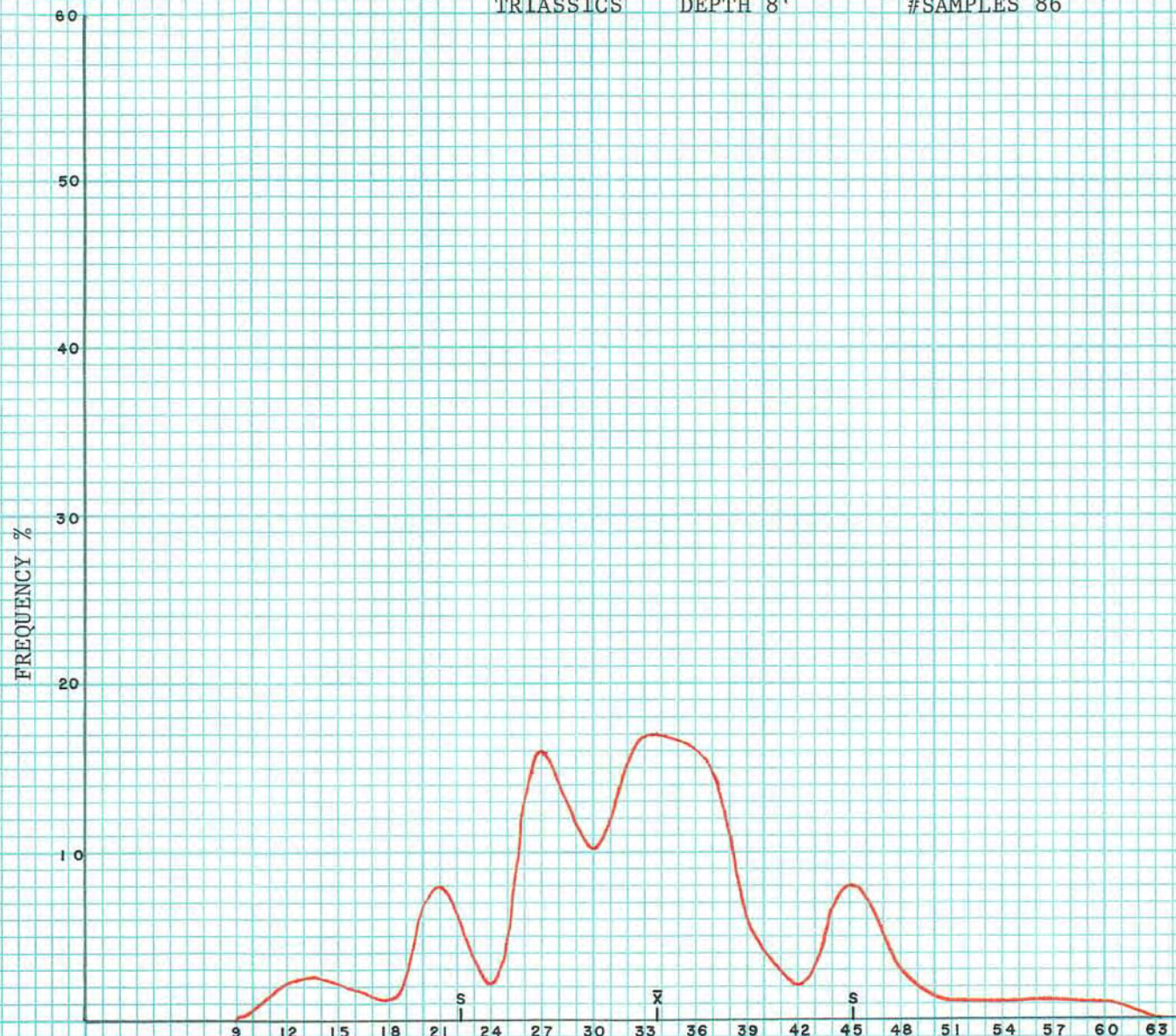

$\bar{x}$ =MEAN VALUE

s=STANDARD DEVIATION

LOCATIONS

6.801749 US 64 East of Zebulon to Wake - Franklin County Line

EQ $\frac{L^2 \text{ POT. } 767 + 1300 \text{ (Proj. } 8.14878 - 6.801824)}{L \text{ POT. } 0 + 00 \text{ (Proj. } 6.801749)}$

EQ $\frac{L^2 \text{ REV. POT. } 766 + 84.33 \text{ (Proj. } 8.14878 - 6.801824)}{L \text{ POT. REV. } 0 + 00 \text{ (Proj. } 6.801749)}$

Wake County line = 100 + 23
S.R. 2337 = 55 + 88

6.801778 US 264 East of Zebulon to Wake - Johnston County line

Wake - Johnston County line = 184 + 60
NC 39 = 146 + 60

8.1409701 I-40 from Raleigh Beltline to Wake - Durham County line

Wake - Durham County line = 253 + 74
Y_{23} = S.R. 1655 = 571 + 95
Cary Connector = Y_{13} = 495 + 86
Y_{18} = 169 + 94 Y_{13}
Y_{19} = 172 + 89 Y_{13}
Y_{20} = 176 + 35 Y_{13}
Y_{21} = 176 + 41 Y_{13}
NC 54 = Y_{22} = 179 + 65.6 Y_{13}

8.14109 NC 98 from NC 50 to Wake-Durham County line

Wake - Durham County line = 497 + 60.4
NC 50 = 567 + 96.06 L' POT.
S.R. 1831 = 537 + 60 L' POT.

8.14773 US 1 & 64 South of Raleigh

US 64 Exit Ramp = 191 + 04.1
Macedonia Road = 358 + 26.0
Western Blvd. = 516 + 09 North Bound Lane
End = 533 + 00

8.14774 US 1 from Wake - Chatham County line to US 64

EQ $\frac{99 + 56.4 \text{ L' Line Bk}}{99 + 19.6 \text{ L Line Ah}}$

EQ $\frac{499 + 35.8 \text{ L POT. Line Bk}}{0 + 00 \text{ PC Line Ah}}$

Wake - Chatham County line = 28 + 55
S.R. 1135 = 208 + 06 L POT.
S.R. 1153 = 454 + 48.6 L POT.
NC 55 = 24 + 56.3 L PC

8.14803 US 70 from S.R. 2547 to Wake - Johnston County line

Begin = 5 + 00
S.R. 2555 = 107 + 66.28 L
S.R. 2558 = 202 + 93.67 L POT.
Wake - Johnston County line = 242 + 04.31

8.14829 US 70 from US 401 Junction to S.R. 2547

EQ $\frac{27 + 51.9 \text{ POT. LB Y'}}{54 + 51.1 \text{ PC LA 27' RT}}$

Begin = 15 + 73
NC 50 = 180 + 70.8
End = 289 + 03

8.14847 NC 98 from Wake Forest to NC 50

S.R. 1846 = 12 + 12.8
S.R. 1908 = 19 + 17.8
S.R. 1907 = S.R. 1005 = 68 + 96.7
S.R. 2003 = 174 + 24
S.R. 1922 = 317 + 13.33
S.R. 1923 = 366 + 93
S.R. 1928 = 397 + 07.7
US 1 = 433 + 27

8.14848 US 1 & 401 North and US 1 North

Begin at Sta 130 + 00

EQ $\frac{127 + 50 \text{ L' L.A.}}{= 197 + 40 \text{ L POT. L.B.}}$

EQ Sta 245 + 11.1 L L.B.
= 245 + 12.9 L L.A.

$L^1 = L^2$

US 1 & 401 Intersection 219 + 17.5 L^2
Buffaloe Road 173 + 99 L

8.14868 US 1 North from US 401 Intersection to Wake Forest

S.R. 2030	110 + 73.24 L
S.R. 2013	146 + 27.97 L
Neuse River	269 + 00 to 270 + 10

8.14876 US 64 East from Wake Memorial Hospital to Eagle Rock

Begins 159 + 46

EQ $\frac{118 + 70 \text{ -L Rev - L.B.}}{0 + 00 \text{ -L -L.A.}}$

EQ Sta $\frac{166 + 41.4 \text{ Line-L- LB.}}{0 + 00 \text{ Line-L-LA.}}$ Between S.R. 2205 and S.R. 2518

S.R. 2205	164 + 68.7
S.R. 2216	64 + 11.30
S.R. 2517	89 + 90.30
S.R. 2036	38 + 66.41 L POT EBL

8.14878 - 6.801824
New US 64 Bypass from Eagle Rock to Zebulon

$L^2 = L$

S.R. 2329	525 + 41.86
S.R. 2325	564 + 22.20
S.R. 2368	647 + 73.08
S.R. 2320	751 + 93.12 L^2 Rev.

8.14904 Bypass US 1 & 64 from US 1 North to US 70 West

Begin at Sta 9 + 00
End at Sta 235 + 00

South Bank Crabtree Creek	18 + 75
Lassiter Mill Road	65 + 75
US INBL	216 + 75

8.14905 Bypass US 1 & 64 from US 70 to South of Hillsboro Street

Begin at Sta 533 + 00 NBL
End Sta 9 + 00 L^6

EQ $\frac{544 + 21\ L^2 \text{ NBL}}{543 + 62 \text{ Med. L.A.}}$

EQ $\frac{583 + 30\ L^2 \text{ NBL}}{583 + 16\ L^2 \text{ SBL}}$
$583 + 50\ L^1$ Med. LA

EQ $\frac{623 + 81\ L^{1}}{121 + 80\ L}$

EQ $\frac{\text{Sta } 237 + 92.9 \text{ -L-L.B.}}{\text{Sta } 0 + 00\ L^{6}\ \text{L.A.}}$

US 70 WBL	233 + 70 L
Hillsboro Street	560 + 63 L^{2}
Lake Boone Trail	134 + 15 L POT.

8.14906 US 64 Bypass from US 1 North to US 64 East

Begin Sta	235 + 00 L^{6}
End Sta	334 + 23.52 L^{6}
US 64 E	316 + 08.6 L^{6} POT.

Rock type: Metamorphics I

Averages

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	30.5	51.0	22.7	0.50	3.0	8.3	16.2	29.2	45.7
Avg. Dev.	6.5	8.4	6.5	0.09	3.1	4.6	4.3	6.5	7.0
Avg. Dev. %	21%	16%	29%	17%	103%	55%	27%	22%	15%
Range	13-42	31-69	11-33	0.33-0.79	0-12	1-22	10-27	14-44	28-66
8' Interval	30.4	51.3	21.1	0.51	3.3	9.2	16.0	27.4	46.3
Avg. Dev.	6.2	7.6	4.6	0.10	3.3	4.9	4.6	7.0	7.1
Avg. Dev. %	20%	15%	22%	20%	100%	53%	29%	25%	15%
Range	13-42	33-69	11-33	0.33-0.79	0-12	2-22	9-27	14-48	28-66
18' Interval	19	31	12	0.43	3	10	14	48	28
Avg. Dev.	-	-	-	-	-	-	-	-	-
Avg. Dev. %	-	-	-	-	-	-	-	-	-
Range	-	-	-	-	-	-	-	-	-
28' Interval	37	62	25	0.58	.5	2.5	12	41.5	44
Avg. Dev.	2	1	1	0.08	.5	.5	1	2.5	4
Avg. Dev. %	5%	2%	2%	14%	100%	20	8%	6%	9%
Range	35-39	61-63	24-26	0.50-0.65	0-1	2-3	11-13	39-44	40-48

Rock type: Metamorphics II

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	32.9	46.6	15.1	0.43	2.9	13.5	26.0	38.3	31.9
Avg. Dev.	7.0	12.4	8.4	0.19	2.6	7.9	5.5	9.3	10.1
Avg. Dev. %	21%	25%	56%	44%	90%	59%	21%	33%	32%
Range	18-58	18-79	0-42	0.0-1.00	0-21	2-38	12-39	8.52	14-51
8' Interval	33.6	52.2	19.1	0.47	3.3	11.9	23.7	27.4	34.1
Avg. Dev.	5.8	9.3	8.7	0.16	2.8	6.8	4.7	11.4	9.2
Avg. Dev. %	17%	18%	46%	34%	85%	57%	20%	42%	25%
Range	20-58	26-71	0-42	0.0-0.91	0-21	2-26	12-37	8-52	15-51
18' Interval	32.2	42.0	9.8	0.37	2.1	16.3	30.1	29.6	24.0
Avg. Dev.	8.2	13.0	6.8	0.24	1.5	6.7	5.1	7.8	6.0
Avg. Dev. %	25%	31%	69%	65%	71%	41%	17%	26%	25%
Range	19-50	19-69	0-23	0.0-1.00	0-5	11-29	22-39	17-43	14-36
28' Interval	28.2	39.6	11.4	0.36	3.6	16.8	28.2	28.2	26.8
Avg. Dev.	6.2	9.2	7.6	0.18	3.6	13.0	7.0	9.4	9.4
Avg. Dev. %	22%	23%	67%	50%	100%	77%	25%	33%	35%
Range	18-35	18-59	0-24	0.0-0.61	0-11	5-38	18-39	16-39	14-42

Rock type: Metamorphics III

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	28.1	41.7	13.1	0.37	4.6	12.4	32.6	22.7	31.6
Avg. Dev.	5.8	9.1	7.5	0.17	2.2	5.8	7.4	5.7	9.3
Avg. Dev. %	21%	22%	57%	46%	48%	47%	23%	25%	29%
Range	14-45	19-67	0-43	0.0-0.86	0-25	1-35	13-62	9-41	11-59
8' Interval	25.4	39.8	14.3	0.38	5.4	11.4	33.6	21.0	33.9
Avg. Dev.	4.7	9.8	7.8	0.17	4.3	9.4	8.9	5.5	10.2
Avg. Dev. %	19%	25%	54%	45%	80%	83%	27%	26%	30%
Range	14-41	19-67	0-43	0.0-0.81	0-25	1-31	15-62	10-39	11-59
18' Interval	30.4	43.9	12.9	0.38	4.4	12.6	29.3	27.2	31.6
Avg. Dev.	4.1	9.0	5.7	0.12	4.0	6.4	6.1	4.7	7.7
Avg. Dev. %	13%	21%	44%	32%	91%	51%	23%	17%	24%
Range	19-36	19-58	0-30	0.0-0.52	0-14	4-35	13-38	17-41	14-56
28' Interval	33.9	45.8	11.9	0.37	2.9	15.7	33.4	22.9	27.9
Avg. Dev.	5.4	6.8	7.6	0.21	1.9	5.8	5.9	4.3	7.9
Avg. Dev. %	16%	15%	64%	57%	66%	37%	18%	19%	28%
Range	20-45	30-61	0-31	0.0-0.86	0-10	5-32	22-42	16-30	11-46

Rock type: Metamorphics IV

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	28.7	46.1	17.7	0.55	3.2	28.3	21.7	19.2	30.8
Avg. Dev.	6.6	10.1	6.9	0.17	4.4	7.6	4.0	4.4	7.1
Avg. Dev. %	23%	22%	39%	31%	137%	27%	19%	23%	23%
Range	12-52	19-77	0-41	0.0-1.24	0-18	2-51	7-37	6-55	12-65
8' Interval	27.4	46.4	18.4	0.57	3.6	30.1	20.9	18.4	31.5
Avg. Dev.	6.2	10.4	6.2	0.15	2.8	7.0	3.9	4.4	9.6
Avg. Dev. %	22%	22%	34%	27%	78%	23%	19%	24%	30%
Range	12-52	19-77	0-41	0.0-1.16	0-18	4-51	10-31	6-55	12-65
18' Interval	30.5	46.3	15.9	0.52	2.3	26.2	22.4	22.3	29.1
Avg. Dev.	7.2	9.9	11.0	0.24	2.1	8.1	4.7	4.3	7.9
Avg. Dev. %	24%	21%	69%	47%	91%	31%	21%	19%	27%
Range	17-49	26-74	0-40	0.0-1.24	0-10	2-42	7-37	15-33	14-64
28' Interval	27.3	41.6	14.3	0.50	2.7	19.9	2.63	26.6	28.6
Avg. Dev.	6.0	6.1	2.0	.07	2.3	8.7	2.7	4.43	3.9
Avg. Dev. %	22%	15%	14%	14%	85%	44%	10%	17%	13%
Range	15-40	30-50	10-19	0.32-0.60	0-7	7-33	21-31	20-32	23-35

Rock type: Metamorphics V

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	29	49.3	20.3	0.51	3.2	15.4	25.0	22.6	37.3
Avg. Dev.	5.8	15.3	9.5	0.13	3.6	7.2	6.8	5.6	10.2
Avg. Dev. %	20%	31%	47%	26%	112%	47%	27%	25%	27%
Range	13-48	13-102	0-66	0.0-1.02	0-24	1-38	6-44	11-41	14-65
8' Interval	28.1	47.4	19.9	0.46	4.1	14.7	25.3	20	36.9
Avg. Dev.	7.2	14.7	9.8	0.13	4.1	7.3	6.6	4.9	11.8
Avg. Dev. %	26%	31%	50%	28%	100%	50%	26%	24%	32%
Range	13-45	13-85	0-51	0.0-0.94	0-16	1-38	13-44	11-34	14-62
18' Interval	29.8	50.9	21.2	0.54	0.6	12.9	23.8	25.7	36.4
Avg. Dev.	5.8	14.4	9.1	0.13	0.8	7.2	6.2	5.5	9.8
Avg. Dev. %	19%	28%	43%	24%	113%	56%	26%	21%	27%
Range	17-48	32-102	9-66	0.35-1.02	0-3	2-23	6-34	11-41	23-65
28' Interval	28.5	48.5	20	0.58	14	22	21.5	22.5	34
Avg. Dev.	9.5	17.5	8	0.03	10	10	4.5	2.5	12
Avg. Dev. %	33%	36%	40%	5%	71%	45%	21%	11%	35%
Range	19-38	31-66	12-28	0.55-0.61	4-24	12-32	17-26	20-25	22-46

Rock type: Metamorphics VI

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	34	45.4	11.9	0.32	3.5	6.4	14	43.5	36.1
Avg. Dev.	5.6	8.8	5.6	0.11	3.6	3.8	2.7	7.9	8.4
Avg. Dev. %	17%	19%	47%	34%	104%	60%	19%	18%	23%
Range	18-47	21-69	2-35	0.105-0.70	0-24	1-18	3-34	22-60	18-62
8' Interval	32.9	46.3	13.3	0.34	3.9	5.8	14.2	42	36.2
Avg. Dev.	6.3	10.8	6.3	0.10	4.2	3.4	6.1	8.2	9.4
Avg. Dev. %	19%	23%	47%	29%	108%	58%	43%	20%	26%
Range	18-47	21-69	2-35	0.105-0.70	0-24	1-18	4-31	22-60	18-62
18' Interval	35.6	45.3	9.7	0.30	2.5	6	13.8	47.4	32.8
Avg. Dev.	4-6	4-9	3.1	0.10	3.3	4.8	4	6.2	5.6
Avg. Dev. %	13%	11%	32%	33%	132%	80%	29%	13%	17%
Range	27-46	36-53	5-17	0-13-0.47	0-9	2-18	5-22	35-57	23-44
28' Interval	32.6	39.8	7.2	.23	3.2	9	11	45.2	34.8
Avg. Dev.	3.6	2.6	1.8	.09	2.6	3.6	5.2	6.2	6.6
Avg. Dev. %	11%	7%	25%	39%	81%	40%	47%	14%	19%
Range	26-37	34-43	4-9	0.11-0.44	1-7	4-14	3-34	35-52	18-44

Rock type: Granite

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	30.0	45.0	15.1	0.43	1.1	28.3	20.6	18.5	32.6
Avg. Dev.	5.1	10.3	7.4	0.14	1.5	7.7	8.6	5.1	9.1
Avg. Dev. %	17%	23%	49%	34%	133%	27%	42%	27%	28%
Range	13-59	13-97	0-54	0.0-1.03	0-18	2-52	4-46	5-42	8-70
8' Interval	30.0	46.0	16.3	0.44	1.1	28.6	19.8	17.5	33.8
Avg. Dev.	6.9	10.9	7.2	0.14	1.4	7.4	6.0	4.8	9.1
Avg. Dev. %	23%	24%	44%	32%	128%	26%	31%	27%	27%
Range	13-59	13-97	0-54	0.0-1.03	0-18	2-52	4-46	5-42	8-70
18' Interval	32.0	43.2	11.0	0.35	1.1	27.5	22.4	22.1	27.0
Avg. Dev.	5.6	8.2	6.2	0.15	1.7	7.6	3.8	4.6	6.4
Avg. Dev. %	18%	19%	57%	43%	153%	27%	17%	21%	24%
Range	22-53	25-86	0-42	0.0-0.68	0-11	11-44	10-41	15-35	8-48
28' Interval	28.0	35.0	7.0	0.44	2.0	24.5	28.0	29.5	15.0
Avg. Dev.	2.0	4.0	2.0	0.21	0	14.5	7.0	3.5	7.0
Avg. Dev. %	7%	11%	29%	47%	0%	59%	25%	12%	47%
Range	26-30	31-39	5-9	0.23-0.64		10-39	21-35	26-33	8-22

Rock type: Triassic

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	20.6	34.3	16.4	0.50	3.6	21.3	14.9	31.4	32.4
Avg. Dev.	3.4	7.7	6.1	0.17	4.4	10.0	14.3	7.7	7.0
Avg. Dev. %	16%	21%	37%	34%	122%	47%	96%	25%	22%
Range	8-48	20-61	4-36	0.13-1.21	0-37	1-47	3-36	4-59	12-60
8' Interval	20.8	36.0	14.3	0.46	3.9	20.8	14.9	31.7	32.9
Avg. Dev.	3.1	7.6	6.0	0.16	4.4	9.8	3.6	7.7	7.0
Avg. Dev. %	15%	21%	42%	34%	112%	47%	24%	24%	21%
Range	8-48	20-61	4-35	0.13-0.93	0-27	1-47	3-32	4-59	12-56
18' Interval	21.7	39.7	18.0	0.59	3.7	23.3	15.0	30.3	31.3
Avg. Dev.	2.6	7.9	6.5	0.19	4.4	10.3	3.4	7.7	5.7
Avg. Dev. %	12%	20%	36%	33%	119%	44%	23%	26%	18%
Range	16-30	25-61	5-36	0.21-1.21	0-37	5-44	7-36	9-57	19-51
28' Interval	20.0	38.4	18.4	0.57	1.0	17.4	15.1	35.2	32.2
Avg. Dev.	2.4	5.8	4.4	0.15	1.1	7.6	2.3	6.4	2.9
Avg. Dev. %	12%	15%	24%	27%	111%	43%	15%	18%	9%
Range	15-26	29-49	12-32	0.33-0.97	0-3	7-31	12-20	23-45	27-36

Rock type: Alluvium

Mean Values

	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Total	20.5	30.6	10.8	.39	4.2	18.6	30.3	25.2	25.5
Avg. Dev.	3.9	7.6	6.2	.17	4.6	9.2	9.8	9.5	6.5
Avg. Dev. %	19%	25%	57%	43%	110%	50%	32%	38%	25%
Range	15-40	16-60	0-41	0.0-1.10	0-22	4-49	12-55	12-53	6-39
8' Interval	20.5	30.6	10.8	.39	4.2	18.6	30.3	25.2	25.5
Avg. Dev.	3.9	7.6	6.2	.17	4.6	9.2	9.8	9.5	6.5
Avg. Dev. %	19%	25%	57%	43%	110%	50%	32%	38%	25%
Range	15-40	16-60	0-41	0.0-1.10	0-22	4-49	12-55	12-53	6-39

TABLE II

Rock type: Metamorphics I — Project: 8.1409701

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
430+00	0-12	A7-5(13)	31	48	17	.40	0	2	13	43	42
432+00	0-27	A7-5(16)	39	63	24	.50	0	2	11	39	48
436+00	12-27	A7-5(18)	35	61	26	.65	1	3	13	44	40
438+00	0-12	A7-5(16)	31	54	23	.61	2	3	18	41	38
459+00	0-18	A6(9)	19	31	12	.43	3	10	14	48	28
Y_{13} 2+00	0-7	A7-5(16)	33	58	25	.48	2	22	11	15	52
Y_{13} 16+00	0-7	A7-5(12)	34	54	20	.43	0	18	19	17	46
Y_{13} 27+00	0-7	A7-6(11)	27	49	22	.48	9	19	21	14	46
Y_{13} 52+00	0-12	A7-6(10)	26	46	20	.47	11	18	25	14	43

Rock type: Metamorphics I — Project: 8.14773

Sta.	Depth	AASHO	P.L.	L.L	P.I.	Act.	CA	CS	FS	Si	Cl
89+00	0-7	A7-5(16)	34	56	22	.46	5	6	9	37	48
91+00	0-7	A6(8)	28	39	11	.33	2	8	12	37	33

Rock type: Metamorphics I — Project: 9.7050301

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
15+00 20' Lt.	0-3	A7-6(19)	17	50	33	.79	2	8	20	30	42

Rock type: Metamorphics I

Project: 9.7050301 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
17+00 20' Lt.	0-3	A7-6(15)	26	49	23	.55	2	8	24	26	42
19+00 20' Lt.	0-3	A7-5(19)	42	69	27	.41	1	4	10	20	66
21+00 20' Lt.	0-3	A7-5(19)	39	66	27	.42	0	3	16	16	65
23+00 20' Lt.	0-3	A6(9)	19	33	14	.45	10	12	27	30	31
25+00 25' Lt.	0-3	A7-5(15)	34	55	21	.47	12	11	12	32	45
25+00 25' Lt.	3-7	A7-5(13)	33	51	18	.39	0	4	14	36	46
23+00 20' Lt.	3-7	A7-5(13)	26	48	22	.50	6	13	21	22	44
21+00 20' Lt.	3-7	A7-5(18)	38	63	25	.44	0	7	13	23	57
19+00 20' Lt.	3-7	A7-5(18)	41	67	26	.46	0	1	12	31	56
17+00 20' Lt.	3-7	A7-5(20)	36	68	32	.62	0	4	16	28	52
15+00 20' Lt.	3-7	A7-6(17)	13	46	33	.79	0	6	23	29	42

Rock type: Metamorphics II

Project: 8.1409701

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
468+00	0-17	A4(6)	11	19	0	.00	1	13	27	42	18
471+00	0-9	A4(8)	20	26	6	.30	3	12	24	44	20
489+00	0-8	A7-5(15)	38	63	25	.52	9	26	12	14	48
494+00	0-9	A7-6(13)	29	52	23	.72	0	19	20	15	46
494+00	9-22	A7-5(5)	31	42	11	.32	0	25	24	17	34
534+00	8-22	A7-5(16)	42	61	19	.59	0	3	22	43	32
536+00	0-31.5	A4(1)	18	18	0	.00	1	28	39	17	16
538+00	0-32	A6(10)	23	40	17	.61	0	6	30	36	28
545+00	0-17	A6(7)	23	34	11	.55	3	7	34	39	20
547+00	19-37	A7-5(9)	31	43	12	.35	5	5	22	39	34
575+00	0-	A7-5(17)	50	72	22	.	0	3	17	32	48
581+00	8-12	A7-5(11)	58	69	11	.32	0	5	27	34	34
620+00	0-22	A4(4)	24	24	0	.00	4	14	39	33	14
628+00	0-17	A4(2)	23	26	3	.15	1	29	29	22	24
616+00	0-12	A7-5(13)	32	51	19	.56	1	7	31	28	34

Rock type: Metamorphics II Project: 8.14109

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
495+00	5-37	A7-5(18)	35	59	24	.57	11	7	18	33	42
498+00	7-12	A7-5(6)	34	45	11	.30	3	16	22	29	33
499+00	0-5	A7-6(8)	28	45	17	.40	4	18	27	12	43
510+00	3-7	A7-6(17)	25	51	26	.79	0	1	25	41	33
524+00	4-7	A7-6(16)	27	61	34	.72	5	16	23	14	47
536+00	4-7	A7-6(6)	27	43	16	.36	3	21	27	8	44
552+00	0-7	A7-5(18)	33	62	29	.57	1	11	21	17	51
557+50	0-5	A7-5(17)	38	60	22	.48	2	7	17	30	46
574+00	0-8	A7-5(13)	38	55	17	.45	2	6	28	28	38

Rock type: Metamorphics II Project: 8.14773

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
202+50	0-7	A4(7)	32	32	0	.00	0	7	30	48	15
203+00	0-7	A4(8)	33	37	4	.22	0	4	26	52	18
234+00	0-7	A7-5(12)	42	55	13	.36	0	2	19	43	36
234+50	0-7	A7-5(18)	37	62	25	.51	5	5	14	32	49

Rock type: Metamorphics II

Project: 8.14847

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
10+00	0-18	A5(3)	36	44	8	.38	5	17	37	25	21
18+00	0-13	A5(3)	39	43	4	.18	2	21	36	21	22
28+00	0-13	A7-5(13)	50	69	19	.53	1	11	25	28	36
54+00	0-7	A7-5(3)	39	51	12	.50	4	24	37	17	24
62+00	10-18	A7-5(10)	35	58	23	1.00	4	23	28	26	23
62+00 ℄	16-23	A2-4(0)	34	38	4	.29	1	38	32	16	14
68+00 ℄	0-8	A7-6(16)	29	71	42	.91	21	20	20	14	46

Rock type: Metamorphics III

Project: 8.14847

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
140+00	10-37	A2-4(0)	32	32	0	.00	4	32	40	17	11
140+00	41-51	A5(5)	40	45	5	.24	1	17	33	29	21
164+00	0-9	A7-5(20)	32	75	43	.81	0	1	15	31	53
172+00	10-20	A4(4)	35	35	0	.00	2	13	38	23	25
229+00	15-23	A7-5(8)	45	61	16	.48	3	18	31	18	33
238+00	33-39	A7-6(18)	20	51	31	.86	4	11	23	30	36
302+00	0-14	A7-5(8)	32	46	14	.45	2	10	35	34	31
302+00	14-18	A7-5(12)	29	53	14	.38	0	4	23	26	37
308+00	4-13	A7-5(8)	37	51	14	.50	0	13	32	27	28
322+00	4-13	A4(5)	30	40	10	.40	0	8	36	31	25
322+00	13-18	A4(6)	31	38	7	.25	10	8	34	30	28
336+00	21-28	A7-5(8)	36	50	14	.58	1	16	32	28	24
336+00	28-32	A7-5(7)	33	47	14	.58	2	16	33	27	24
340+00	38-43	A7-5(16)	30	53	23	.50	0	5	24	25	46
364+00	10-18	A5(7)	35	45	10	.38	0	14	39	21	26

Rock type: Metamorphics III

Project: 8.14904

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
	15+00	0-5	A6(10)	18	36	18	.55	0	8	27	32	33
L^6	28+00	0-44	A4(0)	30	30	0	.00	10	30	40	16	14
L^6	31+00	0-14	A6(6)	27	38	11	.39	10	12	32	28	28
L^6	32+00	0-35	A5(6)	45	45	0	.00	2	6	42	24	28
	38+00	0-5	A7-6(9)	23	41	18	.46	14	9	33	19	39
	41+00	0-5	A4(2)	19	27	8	.44	7	13	49	20	18
L^6	47+00	0-22	A4(1)	19	26	7	.38	14	35	29	18	18
L^6	48+00	0-20	A2-4(0)	19	19	0	.00	2	35	34	17	14
L^6	49+00	0-15	A4(3)	37	37	0	.00	1	11	46	21	22
L^6	51+00	0-5	A6(4)	21	37	16	.47	1	26	30	12	32
	55+00	0-5	A7-6(5)	25	44	19	.56	2	31	26	9	34
	58+00	0-5	A6(4)	20	36	16	.50	1	20	38	10	32
L^6	65+00	0-10	A6(3)	22	34	12	.50	0	29	27	20	24
L^6	67+00	0-15	A7-5(20)	33	63	30	.54	5	12	13	19	56

Rock type: Metamorphics III

Project: 8.14905

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
L	126+00	0-10	A7-5(18)	30	57	27	.49	2	9	21	15	55
L	137+00	0-	A6(3)	20	34	14	.56	5	27	33	15	25
L	138+00	0-5	A6(3)	14	27	13	.52	7	20	38	11	31
L	142+00	0-5	A7-5(16)	34	56	22	.50	8	9	20	27	44
L	144+00	0-10	A7-6(10)	24	44	20	.53	18	17	26	19	38
L	147+00	0-5	A7-6(18)	22	53	31	.56	8	9	19	17	55
L	155+00	0-10	A7-6(7)	26	41	15	.45	5	12	33	22	33
L	156+00	0-15	A7-5(6)	32	44	12	.44	6	14	33	26	27
L	171+00	0-20	A7-5(15)	36	55	19	.49	1	5	23	33	39
L	178+00	0-5	A4(2)	24	31	7	.33	1	9	51	19	21
L	188+00	0-15	A4(5)	40	40	0	.00	1	5	45	27	23
L	194+00	0-10	A4(5)	28	28	0	.00	3	9	44	23	24
L	205+00	0-5	A4(4)	27	27	0	.00	3	6	46	29	19
L	207+00	0-10	A4(4)	26	26	0	.00	0	5	54	30	11
L	198+00	0-5	A4(1)	25	25	0	.00	0	8	62	13	17
L	209+00	0-5	A4(5)	25	25	0	.00	5	6	46	23	25
NBL	532+85	0-10	A4(5)	28	28	0	.00	7	9	42	31	18
NBL	535+00	0-10	A4(4)	32	32	0	.00	9	12	40	22	26

Rock type: Metamorphics III

Project: 8.14905 (Continued)

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
NBL	537+00	0-10	A6(8)	23	38	15	.42	8	12	33	19	36
	537+35	0-10	A4(7)	20	26	6	.27	12	15	24	39	22
	540+77	0-10	A4(5)	30	37	7	.29	25	13	37	26	24
	567+00 ℄	0-5	A6(10)	18	38	20	.43	13	12	29	13	46
	565+00 ℄	0-5	A4(2)	14	19	5	.25	17	17	47	16	20
	570+00 ℄	0-5	A7-6(13)	25	46	21	.36	5	9	21	11	59
	572+00 ℄	0-10	A7-5(10)	35	50	15	.39	3	8	33	21	38
	576+00 ℄	0-5	A6(7)	20	36	16	.44	5	11	33	20	36
	578+00 ℄	0-10	A7-5(16)	32	55	23	.47	0	2	24	25	49
	580+00 ℄	0-10	A6(9)	22	40	18	.43	5	9	30	19	42
	585+00 ℄	0-5	A7-6(6)	29	43	14	.47	1	6	44	20	30
	590+00 ℄	0-10	A7-5(11)	32	49	17	.49	1	3	36	26	35
	592+00 ℄	0-25	A6(4)	26	37	11	.34	3	7	42	19	32
	599+00 ℄	0-28	A7-5(12)	35	54	19	.48	5	16	22	21	40
	603+00 ℄	0-20	A7-5(10)	28	45	17	.50	2	5	35	26	34
	616+00 ℄	0-15	A7-5(18)	34	58	24	.52	12	6	19	29	46
	620+00 ℄	0-5	A7-6(10)	22	44	22	.54	0	8	36	15	41
	623+00 ℄	0-10	A7-5(18)	1	67	26	.52	5	5	15	30	50

Rock type: Metamorphics III

Project: 8.149701

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	C1
666+00	4-27	A7-5(11)	34	48	14	.50	0	8	23	41	28
691+00	0-9	A7-5(15)	33	53	20	.42	0	8	23	21	48

Rock type: Metamorphics IV Project: 8.14847

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
461+00	2-8	A7-5(20)	36	77	41	.63	1	4	10	21	65

Rock type: Metamorphics IV Project: 8.14906

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
213+00	0-5	A6(6)	16	35	19	.59	1	33	18	17	32
299+00	9-13	A4(1)	20	30	10	.42	1	43	17	16	24

Rcok type: Metamorphics IV Project: 8.14876

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
119+00	0-15	A4(2)	29	33	4	.17	2	36	21	20	23
123+00	0-10	A2(4)	20	26	0	.00	7	42	25	20	13
138+00	0-8	A7-6(15)	27	52	25	.49	1	13	22	14	51
8+00	0-12	A6(3)	20	35	15	.60	5	40	20	15	25
26+00	0-11	A6(7)	22	40	18	.53	2	27	19	20	34
61+00	0-12	A7-5(7)	35	53	18	.55	3	38	13	16	33
94+00	0-15	A6(4)	21	37	16	.64	1	42	16	17	25
96+00	0-8	A4(0)	28	28	0	.00	4	46	20	15	19
99+00	0-18	A4(3)	27	34	7	.29	0	32	26	18	24

Rock type: Metamorphics IV — Project: 8.14876 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
105+00	0-13	A4(4)	35	35	0	.00	0	22	27	22	29

Rock type: Metamorphics IV — Project: Borrow from Sear Warehouse

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
	0-20	A6(3)	22	38	16	1.00	10	35	25	24	16
	0-7	A6(5)	15	37	22	1.16	10	30	31	20	19
	0-15	A6(3)	17	32	15	.65	6	34	25	18	23
	0-15	A6(6)	20	38	18	.72	5	29	26	20	25
	0-10	A6(0)	19	30	11	.79	7	45	23	18	14
	0-20	A6(1)	19	30	11	.65	4	34	27	22	17

Rock type: Metamorphics IV — Project: 8.14848

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
148+00	0-10	A7-5(4)	36	50	14	.58	4	38	23	15	24
153+00	0-10	A7-6(6)	29	48	19	.68	10	33	24	15	28
156+00	0-10	A7-6(6)	27	45	18	.82	4	29	27	22	22
162+00	0-10	A7-6(13)	29	54	25	.74	3	19	23	24	34
164+00	0-10	A7-6(6)	24	41	17	.53	2	32	19	17	32

Rock type: Metamorphics IV

Project: 8.14848 (Continued)

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
	170+00	0-10	A7-5(11)	32	54	22	.61	1	22	19	23	36
	175+00	0-10	A7-6(10)	28	48	20	.63	0	23	21	24	32
	179+00	0-10	A7-5(9)	34	50	16	.42	0	25	18	19	38
	182+50	0-10	A7-6(12)	28	52	24	.63	3	27	16	19	38
	188+00	0-10	A7-5(13)	39	59	20	.63	1	18	20	30	32
	190+00	0-10	A7-6(6)	23	41	18	.53	1	36	19	11	34
	196+00	0-10	A4(0)	23	23	0	.00	3	38	31	19	12
	198+00	0-10	A2-4(0)	25	34	9	.64	3	42	28	16	14
	207+00	0-10	A7-5(8)	30	50	20	.63	0	33	18	17	32
	215+00	0-15	A7-5(14)	35	59	24	.63	3	23	15	24	38
	231+00	0-10	A6(4)	27	40	13	.50	5	36	19	19	26
	235+00	0-10	A6(1)	24	35	11	.50	3	37	27	14	22
L	235+00	0-10	A7-6(4)	25	43	18	.60	2	36	20	13	30
	244+00	0-10	A7-6(14)	25	59	34	.89	1	30	18	14	38
	248+00	0-10	A7-5(8)	35	53	18	.56	2	27	24	17	32
	250+00	0-10	A7-5(12)	39	63	24	.67	3	26	22	16	36
	252+00	0-10	A2-4(0)	18	27	9	.64	2	45	30	11	14
	254+00	0-10	A6(4)	23	38	15	.65	8	34	24	19	23

Rock type: Metamorphics IV — Project: 8.14848 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
261+00	0-10	A6(4)	18	32	14	.64	4	34	24	20	22
267+00	0-15	A7-5(7)	30	47	17	.53	2	29	24	15	32
278+00	0-10	A7-6(10)	28	50	22	.73	1	28	23	19	30
284+00	0-10	A7-5(12)	34	55	21	.68	4	23	19	27	31
289+00	0-10	A6(4)	18	33	15	.50	11	34	22	14	30
293+00	0-10	A6(8)	15	36	21	.75	7	29	22	21	28
297+00	0-10	A6(6)	22	38	16	.57	6	26	24	22	28
301+00	0-10	A7-6(10)	22	53	31	.91	11	34	15	17	34
305+00	0-10	A7-6(12)	27	50	23	.74	4	27	18	24	31

Rock type: Metamorphics IV — Project: 8.14868

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CA	FS	Si	Cl
16+00	0-5	A7-5(9)	42	58	16	.41	2	22	19	20	39
18+00	0-8	A7-5(13)	52	65	13	.30	0	12	17	27	44
38+00	0-3	A7-5(5)	20	41	21	.57	2	33	23	6	37
38+00	2-6	A7-6(9)	28	52	24	.60	1	31	19	10	40
41+00	3-8	A7-5(5)	44	48	14	.48	2	32	22	17	29
26+00	4-8	A7-6(8)	26	48	22	.65	5	35	18	13	34
43+00	15-23	A5(1)	40	49	9	.47	0	34	29	18	19

Rock type: Metamorphics IV

Project: 8.14868 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
45+00	0-16	A7-5(13)	48	74	26	.67	0	26	17	18	39
54+80	0-8	A7-5(14)	39	66	27	.64	0	27	16	15	42
59+10	0-8	A7-5(20)	38	70	32	.70	8	18	10	26	46
72+11	0-3	A7-6(11)	21	45	24	.62	9	28	18	15	39
78+00	0-10	A7-6(6)	25	42	17	.63	5	22	29	22	27
78+00	10-13	A6(6)	22	40	18	.72	2	25	28	22	25
80+00	10-18	A7-6(6)	28	43	15	.52	4	34	17	22	27
82+00	12-18	A7-6(10)	25	45	20	.65	1	21	23	25	31
86+00	17-23	A7-6(10)	24	45	21	.66	5	21	19	28	32
102+00	4-8	A4(4)	12	22	10	.38	2	22	28	24	26
108+00	1-8	A7-5(14)	38	68	30	.77	1	32	14	15	39
127+00	0-16	A7-6(20)	26	66	40	.74	0	11	15	20	54
128+00	16-23	A7-6(20)	28	59	31	.67	3	12	16	26	46
146+00	0-4	A7-6(8)	23	47	24	.73	10	28	23	16	33
150+00	3-8	A7-6(13)	34	52	18	.50	0	13	22	39	36
150+00	0-13	A7-6(20)	27	65	38	.70	3	16	10	20	54
150+00	13-18	A7-5(20)	37	71	34	.53	0	2	7	27	64
156+00	0-8	A7-5(10)	32	51	19	.45	1	26	17	15	42

Rock type: Metamorphics IV — Project: 8.14868 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
160+00	0-8	A7-5(7)	40	53	14	.48	0	27	20	24	29
298+00	3-8	A7-5(16)	36	69	33	.87	3	25	29	8	38
322+00	0-6	A7-5(12)	38	59	21	.50	0	21	20	17	42

Rock type: Metamorphics IV — Project: 8.14904

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
L6 75+00	0-5	A7-5(18)	35	60	25	.50	5	10	18	30	50
81+00	0-16	A4(1)	20	26	6	.32	2	27	37	17	19
82+00	0-25	A5(8)	40	50	10	.32	0	12	25	32	31
85+00	0-23	A5(1)	43	43	0	.00	0	14	20	28	38
90+00	0-5	A7-6(10)	25	44	19	.49	0	16	21	24	39
92+00	0-15	A7-5(9)	33	49	16	.53	0	13	27	30	30
95+00	0-20	A5(3)	41	41	0	.00	1	22	31	19	28
97+00	0-25	A7-6(9)	28	47	19	.54	1	14	31	20	35
101+00	0-20	A7-5(11)	34	55	21	.70	0	10	28	32	30
105+00	0-25	A6(6)	15	30	15	.54	0	16	31	24	28
106+00	0-20	A7-6(9)	22	42	20	.67	1	23	21	26	30
109+00	0-5	A4(1)	32	32	0	.00	0	34	30	10	26

Rock type: Metamorphics IV

Project: 8.14904 (Continued)

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
	128+00	0-5	A7-6(7)	28	50	22	.79	5	34	22	16	28
	136+00	0-6	A5(2)	33	41	8	.31	12	37	21	16	26
	140+00	0-10	A7-6(10)	29	53	24	.65	2	30	18	15	37
	144+00	0-17	A7-6(14)	25	63	37	1.08	0	25	24	17	34
	146+00	0-17	A4(2)	33	33	0	.00	2	30	28	18	24
	152+00	0-5	A7-5(16)	32	62	30	.70	0	25	16	16	43
	165+00	0-25	A6(5)	19	33	14	.56	2	31	22	22	25
	168+00	0-15	A7-6(5)	26	42	16	.59	5	37	17	19	27
	171+00	0-15	A7-6(15)	29	60	31	1.24	0	23	23	29	25
	178+00	0-5	A7-6(3)	28	49	21	1.05	18	44	25	11	20
	181+00	0-10	A6(1)	17	29	12	.60	3	38	27	15	20
L^6	185+00	0-5	A7-6(4)	24	42	18	.72	10	49	15	16	25
L^2	192+00	0-11	A7-6(4)	24	41	17	.63	0	36	23	14	27
L^6	197+00	0-20	A5(1)	43	43	0	.00	0	36	25	20	19
L^6	202+00	0-15	A4(1)	39	39	0	.00	10	38	23	18	21
L^6	212+00	0-31	A6(5)	28	40	12	.52	5	26	25	26	23
L^6	216+00	0-28	A7-6(5)	29	44	15	.60	7	33	21	21	25
L	226+00	0-45	A7-5(11)	32	47	15	.45	4	7	29	31	33

Rock type: Metamorphics IV

Project: 9.8052035

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
76+00	2-4	A4(2)	17	26	9	.35	6	34	24	19	23
78+00	0-6	A7-5(5)	21	42	21	.75	10	42	18	12	28
78+00 Rt. 15	1-6	A7-5(10)	39	57	18	.32	1	21	26	17	36
80+00	1-3	A7-6(10)	27	49	22	.55	4	29	16	15	40
82+00	.5-3	A7-6(17)	27	59	32	.65	0	23	12	16	49
86+00	.5-3	A7-6(10)	24	48	24	.50	2	31	17	16	36
88+00	.6-3	A7-6(14)	29	59	30	.51	1	33	15	14	38
90+00	3-3.5	A4(1)	17	26	9	.35	1	40	22	14	24
92+00	0-2	A2(4)	17	19	2	.11	3	51	24	13	12
78+00 Rt. 75	0-7	A7-5(12)	42	62	20	.57	5	25	18	22	35
78+00 Rt. 75	7-17	A5(4)	49	54	5	.36	3	33	20	33	14

Rock type: Metamorphics V

Project: 6.801778

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
89+56	6"-10	A7-5(4)	30	41	11	.46	12	31	19	26	24
89+56	10-13	A6(4)	22	34	12	.46	15	31	21	22	26
90+00	3-13	A4(3)	29	37	8	.40	16	38	15	27	20
91+80	5-23	A4(2)	27	36	9	.38	1	23	34	19	24
92+00	6"-4	A7-5(20)	44	82	38	.61	1	8	14	16	62
92+00	4-10	A7-5(15)	35	55	20	.48	1	12	24	22	42
92+00	10-23	A5(5)	32	41	9	.38	1	21	24	31	24
94+00	4-8	A7-5(18)	37	66	29	.58	2	13	21	16	50
94+00	23-28	A7-5(18)	38	66	28	.61	4	12	17	25	46
95+00	6"-8	A7-5(16)	35	62	27	.59	1	16	19	19	46
95+00	8-23	A4(5)	30	40	10	.36	1	18	27	27	28
95+72	6"-4	A7-5(6)	31	59	28	.61	7	16	19	19	46
95+72	4-11	A7-6(6)	29	43	14	.50	1	20	27	25	28
95+72	11-23	A7-5(16)	39	60	21	.42	0	3	6	41	50
97+00	6"-8	A7-5(12)	33	52	19	.50	1	12	24	26	38
97+00	8-13	A4(4)	31	37	6	.33	1	17	32	33	18
102+00	1-5	A4(5)	20	29	9	.29	2	18	31	20	31
103+00	6"-10	A7-5(6)	30	45	15	.45	3	18	31	18	33

Rock type: Metamorphics V

Project: 6.801778 (Continued)

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
	104+00	6"-10	A4(3)	17	26	9	.31	13	20	35	16	29
	104+00	10'18	A7-5(17)	48	70	22	.54	0	2	18	39	41
	105+15	6"-4	A7-5(20)	31	82	51	.94	4	9	24	13	54
	105+15	4-13	A7-5(15)	39	59	20	.45	1	13	16	27	44
	106+00	6"-4	A7-5(18)	44	69	25	.42	1	9	16	15	60
	106+00	4-8	A7-6(8)	28	46	18	.46	1	21	24	16	39
	106+00	8'18	A7-6(4)	29	41	12	.38	2	23	27	18	32
	106+80	5-14	A7-5(19)	34	61	27	.59	0	9	20	25	46
	106+80	14-18	A7-5(9)	30	50	20	.50	3	22	27	11	40
	107+95	6"-3	A4(0)	13	13	0	.00	8	27	44	15	14
	107+95	3-6	A6(4)	20	34	14	.47	9	21	36	13	30
	107+95	6-9	A7-5(20)	34	85	51	.88	0	8	19	15	58
	107+95	9-12	A7-5(20)	39	75	36	.64	0	4	15	25	56
	108+00	10-18	A7-5(19)	37	64	27	.60	0	3	25	27	45
L_2	110+00	5-8	A4(1)	16	21	5	.28	5	27	37	18	18
L'	110+00	6"-8	A4(2)	19	29	10	.50	14	21	40	19	20
L_2	110+00	6"-5	A4(2)	17	20	3	.17	13	21	42	19	18
	112+30	1-4	A7-6(9)	27	42	15	.38	2	9	28	23	40

Rock type: Metamorphics V — Project: 6.801778 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
114+00	6"-8	A5(9)	36	46	10	.29	0	2	30	34	34
116+00	6"-8	A7-5(18)	45	69	24	.44	0	1	13	32	54
118+00	2-8	A7-5(11)	30	45	15	.34	1	3	25	28	44

Rock type: Metamorphics V — Project: 8.11587

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
90+00	0-6	A7-5(13)	35	56	21	.41	1	18	18	13	51
90+00	6-8	A6(3)	18	33	15	.56	5	31	29	13	27
93+00	12-15	A6(5)	21	32	11	.35	0	17	27	25	31
94+00	0-12	A7-6(14)	22	59	37	.86	5	24	22	11	43
94+00	12-14	A7-5(20)	36	102	66	1.02	0	4	6	25	65
94+00	14-17	A7-6(20)	29	59	30	.68	0	5	21	30	44
94+00	17-18	A7-5(20)	31	63	32	.74	0	5	21	31	43
94+00	18-19	A7-6(12)	24	46	22	.67	0	16	28	23	33
97+50	0-4	A7-5(20)	32	80	48	.77	0	13	13	12	62
97+50	4-5	A7-6(9)	28	46	18	.50	0	12	32	20	36
97+50	5-9	A6(8)	19	36	17	.59	1	11	36	24	29
97+50	9-10	A6(8)	16	33	17	.57	0	10	33	27	30

Rock type: Metamorphics V

Project: 8.11587 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
97+50	10-14	A6(7)	17	32	15	.50	1	11	34	25	30
97+50	14-20	A6(5)	22	37	15	.56	2	20	32	21	27
97+50	20-22	A6(4)	20	32	12	.48	0	18	33	24	25
97+50	22-27	A6(3)	19	31	12	.55	24	32	26	20	22

Rock type: Metamorphics VI

Project: 6.801778

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
128+00	6"-5	A7-5(20)	34	65	31	.50	0	3	8	27	62
128+00	5-8	A5(10)	41	51	10	.31	0	2	12	54	32
130+20	6"-8	A7-5(14)	44	60	16	.35	0	3	16	35	46
130+20	8-13	A5(10)	45	52	7	.22	0	4	17	47	32
130+90	6"-7	A7-5(17)	47	69	22	.41	0	2	9	35	54
130+90	7-14	A5(11)	46	53	7	.25	0	2	13	57	28
130+90	14-18	A5(10)	42	49	7	.27	0	2	14	58	26
140+25	0-3	A4(8)	25	32	7	.25	1	5	17	50	28
142+18	0-3	A4(8)	19	29	10	.38	4	7	25	42	26
142+50	6"-3	A4(6)	19	21	2	.11	16	15	29	38	18
142+50	3-6.5	A4(7)	19	21	2	.105	7	10	27	44	19
142+50	6.5-8	A6(10)	25	39	14	.47	6	5	19	46	30
144+00	6"-8	A7-5(14)	33	52	19	.53	0	2	22	40	36
144+00	8-13	A4(8)	33	39	6	.27	0	1	20	57	22
146+00	7-18	A5(9)	36	46	10	.36	0	5	19	48	28
146+00	18-28	A4(4)	26	34	8	.44	7	14	34	34	18
148+00	6"-7	A7-5(17)	35	58	23	.48	0	3	21	28	48
148+00	7-17	A7-5(13)	35	52	17	.47	0	2	13	49	36

Rock type: Metamorphics VI

Project: 6.801778 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
148+00	17-23	A4(8)	27	37	10	.43	0	2	22	53	23
150+00	7-17	A4(8)	30	39	9	.31	0	2	18	51	29
152+00	6"-8	A6(8)	27	38	11	.35	0	6	18	45	31
124+00	6"-8	A7-5(10)	39	50	11	.34	2	5	18	45	32
125+50	6"-8	A5(10)	41	51	10	.36	0	1	14	57	28
127+50	6"-8	A7-5(9)	34	45	11	.29	0	3	13	46	38
132+00	6"-4	A6(8)	18	29	11	.32	12	10	18	38	34
132+00	4-10	A7-5(20)	32	67	35	.70	0	3	15	32	50
132+00	10-18	A7-5(13)	32	49	17	.43	2	3	16	41	40
134+00	6"-8	A5(11)	45	53	8	.27	0	3	18	49	30
136+40	6"-3	A7-5(17)	34	57	23	.52	0	4	10	42	44
138+00	0-1	A4(8)	25	33	8	.24	4	4	17	46	33
138+00	1-3	A4(5)	30	37	7	.35	4	13	31	36	20
156+15	1-3	A4(8)	23	29	6	.19	0	4	10	55	31
158+00	6"-8	A7-5(12)	36	50	14	.42	1	2	5	60	33
160+00	6"-8	A7-5(15)	42	60	18	.50	0	6	5	53	36
162+00	6"-8	A5(8)	35	41	6	.17	4	7	6	51	36
165+00	6"-6	A7-6(17)	29	55	26	.48	24	15	9	22	54

Rock type: Metamorphics VI

Project: 6.801778 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
171+00	6"-4	A7-5(16)	37	58	21	.35	14	11	6	23	60
173+40	4-18	A5(9)	37	43	6	.16	1	6	4	52	38
175+00	6"-5	A7-6(13)	35	52	17	.28	4	8	4	28	60
175+00	5-17	A5(9)	40	45	5	.13	8	10	5	47	38
175+00	17-28	A5(8)	37	41	4	.11	2	8	4	50	38
176+00	2-12	A4(7)	35	40	5	.13	10	17	12	33	38
176+00	12-17	A4(8)	31	36	5	.15	9	18	12	36	34
176+00	17-33	A4(8)	30	39	9	.25	6	13	10	41	36
178+00	4-18	A5(9)	37	47	10	.23	6	14	7	35	44
178+00	18-33	A5(8)	33	42	9	.20	0	4	3	49	44
180+00	6"-5	A7-5(11)	37	50	13	.28	11	11	5	38	46
180+00	5-13	A5(9)	34	44	10	.22	4	7	4	43	46

Rock type: Granite (Rolesville) Project: 8.14878

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
394+00	3-7	A7-6(14)	26	53	25	.54	0	23	13	18	46
426+00	1-3	A7-5(12)	32	49	17	.39	0	12	15	29	44
436+00	0-10	A4(3)	33	40	7	.29	0	35	20	21	24
436+00	10-15	A5(1)	35	42	7	.44	0	43	18	23	16
430+00	3-8	A5(3)	36	46	10	.77	1	36	21	17	26
498+00	1-4	A7-5(9)	47	60	13	.33	0	23	20	17	40
498+00	4-9	A5(5)	59	59	0	.00	0	30	19	23	28
650+00	11-14	A6(3)	27	38	11	.39	0	33	21	18	28
650+00	14-18	A4(1)	30	34	4	.17	0	37	24	16	23
677+00	9-13	A4(1)	32	39	7	.35	0	43	21	16	20
684+00	0-4	A7-6(5)	32	45	23	.72	0	49	11	8	32
684+00	4-6	A7-5(18)	37	83	46	.78	0	25	6	10	59
684+00	6-8	A7-5(16)	37	70	33	.67	0	29	10	12	49
684+00	8-12	A7-5(9)	38	56	18	.46	2	33	14	14	39
620+00	0-3	A6(4)	18	30	12	.39	1	36	17	16	31
665+00	0-4	A7-6(7)	25	42	17	.47	0	34	15	15	36
669+00	0-8	A6(4)	26	40	14	.54	0	36	21	17	26
677+00	0-5	A7-5(10)	34	52	18	.41	0	29	11	16	44

Rock type: Granite (Rolesville) Project: 8.14878 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
677+00	5-9	A5(3)	33	43	10	.33	0	37	17	16	30
612+00	0-5	A6(4)	23	37	14	.45	1	36	16	17	31
626+00	0-5	A7-6(5)	27	44	17	.57	0	37	18	15	30
647+00	0-2	A6(7)	20	39	19	.51	0	36	12	15	37
647+00	2-6	A7-6(13)	30	55	25	.52	0	26	13	13	48
647+00	6-8	A7-6(6)	28	43	15	.45	0	34	16	17	33
647+00	15-18	A4(2)	30	39	9	.41	0	42	18	18	22
652+00	0-7	A7-6(5)	29	45	16	.50	1	42	13	13	32
651+00	0-2	A7-5(19)	31	73	42	.72	0	21	9	12	58
651+00	2-12	A7-5(8)	31	49	18	.50	0	31	15	18	36
694+00	0-5	A7-6(4)	20	43	23	.77	1	48	13	9	30
694+00	5-9	A7-5(17)	30	60	30	.63	1	30	6	16	48
694+00	9-13	A7-5(12)	33	55	22	.59	1	33	7	23	37
700+00	0-4	A7-5(19)	33	77	44	.69	1	23	4	9	64
700+00	4-8	A7-5(19)	32	63	31	.61	1	24	5	20	51
709+00	1-4	A7-5(20)	43	97	54	.77	0	14	6	10	70
709+00	4-6	A7-5(19)	35	76	41	.77	1	22	7	18	53
709+00	6-8	A7-5(13)	36	61	23	.61	1	30	10	22	38

Rock type: Granite (Rolesville) Project: 8.14878 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
709+00	12-15	A7-5(9)	38	54	16	.44	0	29	14	21	36
709+00	15-18	A5(3)	38	48	10	.36	0	35	18	19	28

Rock type: Granite (Rolesville) Project: 6.801749

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
60+00	7-12	A7-5(7)	33	46	13	.46	0	17	24	31	28
60+00	12-22	A4(3)	30	39	9	.33	0	27	26	20	27
61+00	6"-4	A7-6(12)	27	51	24	.60	0	27	17	16	40
61+00	4-9	A6(4)	28	39	11	.38	0	33	18	20	29
61+00	11-12.5	A7-5(6)	42	57	15	.60	0	29	25	21	25
62+00	6-9	A7-5(15)	38	61	23	.52	0	16	18	22	44
63+00	6"-3	A7-6(4)	21	42	21	.75	0	41	19	12	28
63+00	3-7	A7-5(20)	40	71	31	.65	0	11	13	28	48
63+00	7-8.5	A7-5(9)	41	55	14	.45	0	15	24	30	31
63+00	8.5-12	A7-5(4)	30	41	11	.37	0	27	22	21	30
66+00	3-5	A7-6(13)	27	49	22	.55	0	18	16	26	40
66+00	5-7	A4(3)	26	33	7	.32	0	30	23	25	22
65+00	3-5	A7-5(14)	41	57	16	.47	0	8	16	42	34

Rock type: Granite (Rolesville) Project: 6.801749 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
65+00	5-7	A7-5(5)	33	47	14	.64	0	31	19	28	22
65+00	7-12	A7-5(6)	30	42	12	.43	2	24	22	26	28
67+00	6"-6	A7-6(7)	22	42	20	.57	5	34	18	13	35
67+00	6-7.5	A2-4(0)	22	28	6	.40	0	36	36	13	15
67+00	7.5-12	A4(1)	22	32	10	.45	2	41	21	16	22
68+00	6"-7	A7-5(17)	38	60	22	.41	0	7	20	19	54
68+00	17-22	A7-5(11)	31	54	23	.68	0	21	25	20	34
69+00	6"-6	A7-5(17)	40	66	26	.54	0	16	16	20	48
69+00	6-15	A7-5(15)	43	64	21	.50	0	14	17	27	42
69+00	15-16.5	A5(2)	53	53	0	.00	0	21	38	27	14
69+00	16.5-22	A7-5(19)	39	66	27	.68	0	13	18	29	40
71+00	6"-10	A7-5(20)	44	86	42	.63	0	6	12	15	67
71+00	10-20	A7-6(5)	27	43	16	.55	3	35	18	18	29
71+00	20-21.5	A4(1)	32	32	0	.00	7	41	25	26	8
71+00	21.5-27	A4(1)	30	39	9	.64	2	39	21	26	14
73+00	6"-5	A7-5(17)	41	69	28	.56	0	13	20	17	50
73+00	5-10	A7-5(5)	38	49	11	.44	0	28	18	29	25
73+00	10-13	A7-5(5)	30	44	14	.50	0	29	22	21	28

Rock type: Granite (Rolesville) Project: 6.801749 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
73+00	13-17	A7-6(6)	28	44	16	.57	5	26	25	21	28
73+00	17-18.5	A4(1)	38	38	0	.00	0	25	38	29	8
73+00	18.5-22	A7-6(5)	29	45	16	.67	0	26	27	23	24
61+00	9-11	A7-5(12)	33	55	22	.55	0	24	18	18	40
61+00	12-18	A7-5(5)	33	45	12	.41	0	29	23	19	29
61+00	18-22	A6(4)	26	49	13	.43	0	24	28	18	30
62+00	9-12	A7-5(9)	32	51	19	.59	7	27	19	22	32
63+00	12-17	A4(2)	28	35	7	.29	2	37	24	15	24
62+00	0-6	A2-4(0)	18	19	1	.08	3	43	25	19	13
69+00	0-6	A2-4(0)	17	18	1	.09	4	51	25	13	11
51+00	6"-4	A7-5(20)	41	71	30	.54	0	2	11	31	56
51+00	4-13	A7-5(16)	41	60	21	.55	0	5	19	38	38
51+00	14.5-17	A7-5(10)	35	49	14	.47	0	11	24	35	30
51+00	17-22	A5(7)	35	45	10	.38	0	12	27	35	26
51+00	0-6	A2-4(0)	13	13	0	.00	9	44	28	17	11
51+00	13-14.5	A4(3)	30	30	0	.00	0	15	41	26	18
53+00	8-9.5	A4(1)	30	30	0	.00	10	35	29	22	14
55+00	0-1	A2-4(0)	15	15	0	.00	6	52	27	10	11

Rock type: Granite (Rolesville) Project: 6.801749 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
55+00	5-6.5	A7-5(16)	48	67	19	.38	0	4	10	36	50
57+00	0-5	A7-5(17)	35	65	30	.56	3	21	14	11	54
59+00	15.4-16.9	A4(2)	31	31	0	.00	0	25	32	27	16
58+00	9-12	A4(3)	20	27	7	.27	0	24	31	19	26
58+00	12-22	A4(1)	23	25	2	.11	0	25	36	21	18
52+00	5-12	A5(4)	37	46	9	.35	2	38	28	16	26
52+00	12-17	A5(3)	34	42	8	.36	4	32	22	24	22
53+00	6"-8	A7-5(20)	44	73	29	.56	0	8	10	30	52
53+00	12-17	A7-5(12)	44	57	13	.38	0	15	17	34	34
54+00	1-8	A7-6(10)	26	48	22	.58	13	30	14	18	38
54+00	8-12	A4(4)	26	33	7	.26	13	31	18	24	27
55+00	1-5	A7-5(20)	44	75	31	.57	2	21	11	14	54
55+00	8-12	A7-5(6)	34	45	11	.38	0	26	20	25	29
57+00	5-9.3	A4(4)	24	33	9	.29	0	15	33	21	31
57+00	9.3-10.8	A4(1)	26	26	0	.00	0	17	46	23	14
57+00	10.8-17	A7-6(8)	22	41	19	.54	0	21	29	15	35
59+00	6"-7	A7-6(11)	27	50	23	.55	0	29	13	16	42
59+00	7-12	A4(4)	24	31	7	.24	0	24	25	22	29

Rock type: Granite (Rolesville) Project: 6.801749 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
59+00	12-15.4	A4(3)	23	28	5	.17	0	27	28	16	29
59+00	16.9-18	A4(3)	26	31	5	.22	0	27	29	21	23
59+00	18-22	A7-6(6)	29	41	12	.39	0	22	23	24	21

Rock type: Granite (Rolesville) Project: 8.14868

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
176+00	0-8	A5(1)	45	45	0	.00	3	34	27	21	18
194+00	1-8	A2-4(0)	15	15	0	.00	1	36	36	17	11
218+00	4-8	A7-5(9)	40	57	17	.49	0	24	24	17	35
246+00	0-8	A7-5(13)	32	52	20	.54	0	18	14	31	37
248+00	0-8	A7-6(11)	18	48	30	1.03	0	23	32	16	29

Rock type: Granite (Rolesville) Project: 8.14803

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Borrow	0-7	A4(2)	20	30	10	.37	1	29	28	16	27
Pit #1	0-7	A7-5(20)	55	86	31	.54	0	6	10	27	57
Bingham	0-7	A7-5(7)	32	46	14	.37	0	10	32	20	38
Bingham	0-7	A6(5)	27	40	13	.41	0	26	28	14	32
Bingham	0-7	A7-5(8)	33	48	15	.43	0	26	18	21	35

Rock type: Granite (Rolesville)

Project: 8.14803 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Bingham	0-7	A7-6(8)	29	45	16	.41	0	15	26	20	39
Bingham	5-7	A7-5(8)	36	50	14	.40	0	24	20	21	35
Bingham	0-5	A7-5(16)	33	61	28	.62	0	23	15	17	45
Bingham	5-7	A7-5(6)	31	45	14	.45	0	28	18	23	31
Bingham	0-4	A7-6(6)	23	41	18	.51	0	28	24	13	35
Bingham	4-7	A7-5(6)	32	43	11	.33	0	12	33	22	33
Bingham	5-7	A4(3)	30	39	9	.36	0	35	19	21	25
Bingham	0-3	A4(1)	16	22	6	.27	0	34	30	14	22
Bingham	3-7	A7-5(13)	30	52	22	.54	0	17	24	18	41
WRAL	0-6	A7-6(4)	26	42	16	.62	5	40	16	18	25
Borrow	0-7	A2-6(1)	20	34	14	.58	1	35	33	8	24
Pit	0-7	A7-5(4)	34	50	16	.50	1	28	24	16	32
Pit 1A	0-10	A7-5(5)	32	49	17	.59	0	34	23	14	29
Smith	0-10	A7-6(4)	28	44	16	.64	0	35	23	17	25
Pit 2A	0-5	A7-5(15)	35	61	26	.60	0	21	18	18	43
Pit 3A Smith	0-13	A6(3)	27	40	13	.57	2	41	17	19	23
Smith Pit 3	0-13	A6(1)	24	35	11	.52	2	42	20	17	21

Rock type: Granite (Rolesville) Project: 8.14803 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Borrow Pit 2	0-7	A2-4(0)	16	25	9	.41	1	33	37	8	22
Bingham	0-7	A2-4(0)	16	21	5	.45	0	35	38	16	11
Bingham	0-7	A2-4(0)	15	15	0	.00	0	41	43	5	11
Bingham	0-7	A6(1)	19	30	11	.48	0	32	34	11	23
Bingham	0-7	A2-4(0)	18	28	10	.43	0	31	38	8	23
Bingham	0-7	A2-4(0)	14	14	0	.00	0	45	42	5	8
Bingham	0-7	A2-4(0)	15	15	0	.00	0	40	40	6	14
Bingham	0-7	A2-4(0)	16	25	9	.41	1	40	30	8	22
Bingham	0-7	A2-4(0)	16	23	7	.32	1	33	37	8	22
Bingham	0-7	A2-4(0)	15	15	0	.00	0	37	37	9	17
Bingham	0-7	A2-4(0)	18	18	0	.00	0	37	37	9	17
Smith Pit 4A	0-13	A6(4)	19	33	14	.52	0	31	24	18	27

Rock type: Granite (Rolesville) Project: 8.14876

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Upham Pit (Bunch)	0-6	A5(6)	38	47	9	.24	0	30	13	20	37

Rock type: Granite (Rolesville) Project: 8.14876 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Upham Pit (Bunch)	6-13	A7-6(4)	29	42	13	.52	0	37	17	21	25
Upham Pit (Bunch)	0-7	A7-5(7)	32	47	15	.47	0	29	16	23	32
Upham Pit (Bunch)	0-5	A4(4)	26	29	3	.08	0	32	15	13	40
Upham Pit (Bunch)	5-10	A7-6(19)	20	56	36	.60	0	6	10	24	60
Upham Pit (Bunch)	0-6	A7-6(17)	20	52	32	.65	0	14	15	22	49
Upham Pit (Bunch)	6-10	A7-6(14)	18	43	25	.57	0	7	24	25	44
Upham Pit (Bunch)	0-4	A5(6)	19	35	16	.48	0	30	18	19	33
Upham Pit (Bunch)	4-12	A7-6(15)	18	44	26	.55	0	8	18	27	47
Upham Pit (Bunch)	0-8	A7-5(12)	31	56	25	.60	0	30	14	14	42
Upham Pit (Bunch)	8-13	A7-5(5)	33	47	14	.45	0	33	17	19	31
Upham Pit (Bunch)	13-18	A5(3)	33	42	9	.35	0	33	19	22	26
Upham Pit (Bunch)	0-7	A7-5(13)	35	56	21	.45	0	21	18	14	47

Rock type: Granite (Rolesville) Project: 8.14876 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Upham Pit (Bunch)	0-6	A5(6)	47	56	9	.30	0	28	21	21	30
Upham Pit (Bunch)	6-13	A5(4)	42	48	6	.27	0	30	24	24	22
Upham Pit (Bunch)	0-7	A7-5(10)	49	61	12	.32	0	20	17	26	37
Upham Pit (Bunch)	7-12	A7-5(7)	38	51	13	.52	0	33	13	29	25
Upham Pit (Bunch)	0-10	A6(4)	25	39	14	.45	6	29	24	16	31
Upham Pit (Bunch)	10-13	A6(6)	26	40	14	.44	2	29	17	22	32
Upham Pit (Bunch)	0-8	A7-5(9)	30	48	18	.45	0	27	17	16	40
Upham Pit (Bunch)	8-13	A5(6)	37	46	9	.31	0	28	15	28	29
Upham Pit (Bunch)	0-8	A7-5(10)	36	54	18	.50	0	29	15	20	36
Upham Pit (Bunch)	8-13	A4(3)	29	37	8	.36	0	29	26	23	22
Upham Pit (Bunch)	0-18	A7-6(10)	26	50	24	.65	0	32	16	15	37
Upham Pit (Bingham)	0-14	A5(5)	43	43	0	.00	0	26	15	26	33

Rock type: Granite (Rolesville) Project: 8.14876 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Upham Pit (Bingham)	0-7	A4(4)	40	40	0	.00	0	27	18	19	36
Upham Pit (Bingham)	7-13	A5(4)	46	46	0	.00	0	32	17	27	24
Pilkington Pit (Bingham)	0-13	A4(1)	25	32	7	.37	0	46	17	18	19
Pilkington Pit (Bingham)	12-17	A4(1)	25	31	6	.31	0	39	22	20	19
Pilkington Pit (Bingham)	5-15	A7-5(17)	40	62	22	.46	0	14	10	28	48
Paschal Pit	0-4	A7-6(7)	25	45	20	.57	0	32	19	14	35
Paschal Pit	0-5	A7-6(7)	21	42	21	.55	0	32	19	10	38
Paschal Pit	0-4	A7-6(6)	27	45	18	.50	0	32	20	12	36
Paschal Pit	0-4	A7-5(9)	34	53	19	.51	0	30	15	18	37
Paschal Pit	0-5	A7-6(4)	27	42	15	.52	0	39	20	12	29
Paschal Pit	5-8	A7-6(8)	24	41	17	.49	0	13	30	22	35
Paschal Pit	0-7	A7-6(6)	25	44	19	.56	0	35	20	11	34
Paschal Pit	0-4	A7-6(7)	25	45	20	.56	0	33	19	12	36
Paschal Pit	0-8	A7-6(6)	22	41	19	.56	1	32	23	11	34
Paschal Pit	0-7	A7-6(7)	27	45	18	.50	0	30	19	15	36

Rock type: Granite (Rolesville) Project: 8.14876 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Paschal Pit	0-8	A7-6(8)	28	48	20	.53	1	32	19	11	38
Paschal Pit	0-5	A6(6)	17	38	21	.64	0	35	20	12	33
Paschal Pit	0-5	A7-5(13)	33	56	23	.48	0	26	14	12	48
Paschal Pit (Bingham)	0-4	A7-6(8)	28	48	20	.56	0	34	15	15	36
Paschal Pit (Bingham)	0-5	A7-6(8)	25	47	22	.58	0	43	7	12	38
Paschal Pit (Bingham)	0-4	A7-6(8)	26	47	21	.51	0	33	16	10	41
Paschal Pit (Bingham)	0-4	A7-5(15)	31	61	30	.65	1	31	13	10	46
Paschal Pit (Bingham)	0-5	A7-6(7)	24	43	20	.54	1	33	19	11	37
Paschal Pit (Bingham)	0-5	A7-6(11)	27	51	24	.60	1	31	17	12	40

Rock type: Granite (Rolesville) Project: 8.1158701

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
32+44	0-5	A7-5(9)	35	52	17	.40	2	26	19	13	42
32+44	5-7	A6(5)	27	39	12	.36	18	29	17	21	33
35+00	0-7	A5(1)	52	58	4	.18	2	38	24	16	22

Rock type: Granite (Rolesville)

Project: 8.1158701 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
35+00	7-12	A7-5(5)	42	54	12	.36	1	25	25	17	33
38+00	0-5.5	A4(1)	22	30	8	.32	11	38	23	14	25
38+00	5.5-7	A2(4)	20	22	2	.12	1	44	25	14	17
44+00	0-6	A7-5(2)	30	44	14	.54	1	35	26	13	26
44+00	6-7	A4(0)	30	40	10	.48	0	40	26	13	21
47+00	0-9	A7-5(6)	36	50	14	.42	0	29	16	18	33
47+00	0-12	A2-4(0)	34	36	2	.12	1	44	25	14	17
50+00	0-5	A7-5(15)	41	63	22	.45	1	20	15	16	49
50+00	5-12	A7-5(8)	35	50	15	.43	11	31	13	21	35
50+00	12-18	A7-5(12)	41	57	16	.40	2	13	18	29	40
71+00	0-7	A7-5(9)	39	55	16	.34	2	19	21	13	47
71+00	7-12	A7-5(9)	33	50	17	.49	13	23	21	21	35
71+00	12-17	A4(2)	25	34	9	.35	3	32	26	16	26
71+00	17-22	A6(3)	26	38	12	.46	11	40	17	17	26
74+00	0-4	A7-5(10)	30	51	21	.55	2	28	18	16	38
74+00	4-7	A7-6(4)	28	41	13	.42	2	32	20	17	31
74+00	7-12	A4(0)	22	27	5	.29	8	43	22	18	17
74+00	12-17	A4(1)	26	34	8	.42	9	44	20	17	19

Rock type: Granite (Rolesville) Project: 8.1158701 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
76+77	0-7	A7-5(11)	37	45	13	.43	0	31	22	17	30
76+77	7-10	A7-5(4)	35	56	21	.41	1	18	18	13	51

Rock type: Granite (Rolesville) Project: 9.7053202

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
1+00	0-6	A7-5(17)	42	67	25	.44	0	22	8	13	57
1+00	6-7	A6(7)	34	49	15	.41	0	27	15	21	37
3+00	3-7	A7-5(16)	31	59	28	.58	0	28	9	15	48
5+00	0-3	A6(5)	28	39	11	.26	1	33	12	13	42
7+00	0-4	A7-6(6)	21	41	20	.59	1	39	16	11	34
7+00	4-7	A7-5(14)	36	60	24	.56	2	27	12	18	43
15+00	5-7	A7-5(9)	37	58	21	.53	1	36	15	9	40

Rock type: Granite (Reedy Creek Quartz Monzonite) Project: 8.1409701

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
495+00	0-32	A4(6)	26	31	5	.23	2	10	35	33	22
497+00	0-7	A4	17	23	6	.26	2	36	31	10	23
501+00	20-22	A4	23	28	5	.25	0	34	27	19	20
532+00	0-7	A6(5)	26	38	12	.38	0	22	26	20	32

Rock type: Ultramafics

Project: 8.14847

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
92+00	6-13	A7-6(20)	28	77	49	.72	0	5	12	17	66
231+00	10-25	A7-5(7)	31	43	12	.26	1	15	22	16	47
231+00	25-35	A7-5(6)	30	41	11	.33	2	19	24	24	33
234+00	15-25	A4(5)	23	33	10	.38	0	12	34	28	26
235+00	6-13	A7-5(17)	42	65	23	.38	1	5	13	21	61

Rock type: Triassic

Project: 8.1409701

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
302+00	0-10	A6(9)	20	39	19	.50	1	21	20	21	38
304+00	3-12	A7-6(17)	19	47	28	.74	0	11	9	42	38
304+00	12-17	A4(4)	18	27	9	.38	16	35	16	25	24
306+00	5-14	A4(5)	17	27	10	.33	11	26	17	27	30
310+00	0-10	A6(8)	17	30	13	.41	10	19	15	34	32
310+00	10-18	A6(9)	16	30	14	.44	10	15	19	34	32
314+00	0-30	A4(7)	21	28	7	.23	8	20	15	35	30
350+00	0-8	A6(9)	18	33	15	.36	1	11	10	37	42
352+00.5	0-16	A4(6)	17	25	8	.27	2	24	13	33	30
358+00	0-13	A4(5)	18	23	5	.18	2	25	15	32	28
360+00	0-5	A4(7)	19	29	10	.30	10	18	13	35	34
369+00	3-12	A4(8)	17	27	10	.31	2	21	13	34	32
373+00	0-6	A4(8)	19	30	11	.29	2	11	10	41	38
377+00	6-19.5	A4(8)	17	27	10	.28	4	16	11	37	36
379+00	2-7	A4(6)	19	25	5	.25	14	20	20	36	24
381+00	0-8	A6(9)	21	33	12	.33	5	15	10	39	36
390+00	0-6	A4(5)	21	28	7	.19	20	28	14	32	26
390+00	6-12	A4(5)	19	28	9	.30	14	29	11	30	30

Rock type: Triassic

Project: 8.1409701 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
394+00	0-3	A7-6(12)	24	43	19	.43	11	11	8	37	44
394+00	3-8	A4(6)	21	29	8	.27	13	21	16	33	30
394+00	8-10	A4(2)	17	22	5	.25	21	42	15	23	20
408+00	0-4	A4(7)	22	32	10	.28	17	21	13	30	36
410+00	0-3	A6(6)	21	32	11	.32	19	25	14	27	34
412+00	4-12	A6(8)	18	31	13	.30	15	21	12	33	44
416+00	0-4	A6(8)	18	32	14	.39	10	22	14	28	36
Y_{-6} 68+00	0-5	A6(11)	8	30	22	.65	3	18	19	29	34
Y_{-10} 10+00	0-7	A4(3)	17	24	7	.33	4	33	23	23	21
Y_{-11} 38+00	0-1	A6(8)	19	30	11	.31	1	7	11	46	36
Y_{-6} 140+69	0-7	A4(8)	17	27	10	.29	1	16	12	38	34
Y_6 116+00	0-13	A4(1)	17	21	4	.22	27	46	18	18	18
Y_6 10+00	0-7	A4(6)	27	34	7	.23	2	21	18	31	30
Y_6 30+00	10-17	A4(4)	24	30	6	.21	4	28	18	26	28
Y_6 54+00	0-14.5	A4(3)	20	25	5	.23	18	33	20	25	22
Y_{11} 10+00	0-7	A4(7)	19	27	8	.50	8	18	16	51	15
Y_{11} 18+00	0-7	A6(9)	19	32	13	.34	1	18	9	35	38
Y_{11} 28+00	0-7	A4(8)	21	28	7	.25	2	8	13	51	28

Rock type: Triassic

Project: 8.1409701 (Continued)

	Sta.	Depth	AASHO	P.L	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
Y_8	18+00	9-22	A6(12)	16	40	24	.86	4	16	19	37	28
Y_8	19+00 Rev.	0-3.8	A4(4)	21	27	6	.23	4	26	20	28	26
	19+00	3.8-5.5	A4(3)	18	24	6	.27	13	35	19	24	22
	19+00	5.5-8	A6(9)	19	32	13	.36	4	12	13	39	36
Y_8	11+00 Rev.	5-7	A6(6)	21	33	12	.35	8	24	17	25	34
Y_8	9+00 Rev.	0-4.5	A4(4)	16	20	4	.13	1	26	21	31	22
Y_8	7+00 Rev.	0-5	A7-6(14)	23	45	22	.20	1	15	13	26	46
	7+00	9-18	A4(5)	20	26	6	.25	37	28	16	32	24
Y_8	4+00 Rev.	3-9.5	A7-6(19)	24	57	35	.58	0	8	9	23	60
Y_8	60+00 Rev.	0-7	A7-6(14)	24	46	22	.39	0	2	3	39	56
Y_8	60+00 Rev.	7-11.5	A6(10)	22	37	15	.31	0	1	10	41	48
Y_6	62+00 Rev.	4-8.5	A6(9)	20	33	13	.33	1	10	13	37	40
Y_6	133+00 Rev.	0-7	A6(10)	21	37	16	.36	0	8	13	34	45
Y_6	133+00 Rev.	7-12	A6(8)	17	28	11	.30	2	18	13	32	37

Rock type: Triassic — Project: 8.1409701 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
264+00	3-9	A7-6(13)	24	45	21	.44	1	9	11	32	48
388+00	0-7	A4(8)	20	29	9	.30	6	15	15	40	30

Rock type: Triassics — Project: 8.14773

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
38+50	0-7	A7-6(14)	17	42	25	.68	0	13	12	38	37
39+50	0-7	A7-6(15)	19	44	25	.93	0	7	7	59	27
40+50	0-7	A7-6(16)	17	45	28	.61	0	11	7	36	46

Rock type: Triassic — Project: 8.14774

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
L' 31+00	0-6	A6(9)	20	33	13	.38	0	6	22	38	34
L' 49+00	0-18	A6(8)	21	32	11	.32	8	8	15	43	34
L' 53+00	0-30	A6(10)	20	36	16	.44	0	9	15	40	36
L' 53+00 Rev.	0-36	A6(10)	20	35	15	.48	0	15	14	40	31
L' 57+00	0-8	A7-6(15)	20	45	25	.69	0	3	10	45	36
L' 63+00	0-11	A7-6(11)	25	42	17	.47	0	11	9	44	36

Rock type: Triassic

Project: 8.14774 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
L' 67+00	0-12	A6(13)	16	39	23	.61	0	5	9	48	38
L' 74+00	0-9	A6(10)	20	36	16	.47	0	7	14	45	34
L' 79+00	0-30	A6(7)	16	29	13	.46	0	18	20	34	28
L' 82+00	0-25	A6(9)	19	31	12	.33	0	7	17	40	36
L' 93+00	0-7	A7-6(12)	28	43	20	.40	0	1	13	36	50
L' 93+00	0-22	A4(3)	24	32	8	.40	0	17	36	18	20
L 102+00	0-15	A7-6(5)	24	41	17	.85	8	41	13	26	20
L 106+50	0-5	A4(4)	17	21	4	.33	0	17	32	39	12
L 114+00 40' Rt.	0-11	A6(10)	17	37	20	.71	0	19	21	32	28
L 121+00	0-30	A6(10)	19	35	16	.53	2	10	15	45	30
L 138+00	0-5	A4(0)	17	22	5	.38	5	47	20	20	13
L 147+00	0-8	A6(10)	18	34	16	.50	0	7	20	42	32
L 150+00	0-20	A6(9)	19	32	13	.38	3	7	13	46	34
L 159+90	0-24	A6(12)	21	40	19	.53	0	12	12	40	36
L 163+00	0-22	A7-6(12)	21	41	20	.61	0	3	7	57	33
L 170+00	0-5	A6(10)	22	37	15	.52	0	6	14	51	29
L 175+00	0-5	A7-6(9)	23	41	18	.55	0	20	21	26	33
L 187+00	0-11	A6(9)	23	40	17	.61	0	18	18	36	28

Rock type: Triassic

Project: 8.14774 (Continued)

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
L	193+00	0-7	A6(6)	17	28	11	.46	0	18	20	38	24
L	196+00	0-19	A6(8)	17	31	14	.47	0	19	20	31	30
L	199+00	0-21	A7-6(4)	26	42	16	.70	0	42	13	22	23
	208+00	0-14	A7-6(14)	23	46	23	.49	0	9	10	34	47
	214+00	0-18	A7-6(11)	24	50	26	.76	0	32	16	18	34
	215+00	0-16	A7-6(13)	23	52	29	1.00	0	29	18	24	29
	221+00	0-5	A6(3)	19	33	14	.67	0	39	20	20	21
	245+00	0-8	A7-6(11)	23	44	21	.62	0	23	15	28	34
	231+00	0-18	A7-6(6)	23	47	24	1.00	0	44	14	18	24
	236+50	0-10	A7-6(8)	19	41	22	.81	0	29	23	21	27
	250+00	0-14	A7-6(8)	22	42	20	.56	0	16	18	30	36
	257+00	0-10	A7-6(12)	24	45	21	.58	0	19	15	30	36
	270+00	0-5	A7-6(10)	22	42	20	.65	0	25	15	29	31
	275+00	0-20	A6(10)	21	35	14	.38	0	5	13	45	37
	281+00	0-15	A7-6(15)	20	46	26	.59	0	7	8	41	44
	283+00	0-22	A7-6(12)	20	41	21	.64	0	15	14	38	33
	292+00	0-5	A6(4)	23	35	12	.55	3	28	25	25	22
	300+00	0-13	A7-6(14)	24	46	22	.47	0	3	7	43	47

Rock type: Triassic

Project: 8.14774 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
301+00	0-6	A7-6(20)	29	61	32	.60	0	4	11	32	53
301+00	6-19	A6(10)	21	37	16	.41	1	8	11	42	39
309+00	0-23	A7-6(16)	29	53	24	.67	0	25	11	28	36
309+00'	0-25	A7-6(15)	15	47	32	.97	2	26	12	29	33
335+00	0-5	A4(2)	16	21	5	.33	3	40	18	27	15
338+00	0-19	A7-6(11)	24	45	21	.70	2	24	12	34	30
341+00	0-20	A6(3)	20	38	18	.95	1	44	17	20	19
343+00	0-14	A6(5)	21	33	12	.50	0	30	21	25	24
349+00	0-9	A6(9)	18	39	21	.62	0	30	13	23	34
353+00	0-15	A7-6(11)	23	41	18	.49	0	18	11	34	37
356+50 E of Lt. Lane	0-7	A7-5(12)	48	59	11	.32	0	12	18	36	34
358+00	0-13	A6(8)	19	39	20	.71	0	31	17	24	28
361+00	0-10	A7-6(15)	25	50	25	.61	0	21	12	26	41
370+00	0-7	A7-6(9)	22	46	24	.83	3	39	11	21	29
378+00	0-20	A6(2)	27	40	13	.68	0	44	16	21	19
391+00	0-9	A6(3)	25	37	12	.57	2	43	15	21	21
394+00	0-10	A7-6(6)	26	44	18	.64	2	38	14	20	28
406+00	0-5	A4(0)	16	26	10	.50	4	51	14	15	20

Rock type: Triassic

Project: 8.14774 (Continued)

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
414+00	0-13	A7-5(6)	30	50	20	.77	2	40	15	19	26
417+00	0-14	A7-5(13)	30	54	24	.77	3	33	13	23	31
425+00	0-13	A7-6(6)	24	44	20	.74	2	40	14	19	27
428+00	0-10	A7-6(9)	28	52	24	.77	2	38	15	16	31
415+00	0-29	A7-6(7)	26	44	18	.67	2	31	19	23	27
424+00	0-21	A7-6(9)	23	46	23	.74	3	35	15	19	31
433+00	0-7	A6(4)	21	38	17	.77	3	40	18	20	22
433+00	0-9	A7-6(16)	26	50	24	.55	0	12	11	33	44
454+00	0-17	A7-6(12)	21	42	21	.58	0	19	11	34	36
458+00	0-20	A7-6(20)	25	61	36	.86	0	8	15	35	42
463+00	0-12	A6(5)	23	37	14	.50	0	32	19	21	28
471+00	0-5	A6(3)	21	37	18	.50	0	37	23	4	36
476+00	0-15	A7-6(15)	22	51	29	1.21	3	28	13	35	24
485+00	0-12	A7-6(8)	25	47	22	.61	0	35	16	13	36
486+00	0-33	A7-6(11)	24	49	25	.76	3	29	16	26	33
489+00	0-19	A7-6(13)	26	53	27	.56	4	31	12	9	48
490+00	0-18	A7-6(19)	22	54	32	.63	2	7	8	34	51

Rock type: Alluvium

Project: 8.14774

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
L	129+00	0-5	A6(10)	16	30	14	.50	0	9	19	44	28
L	180+00	0-5	A6(8)	20	31	11	.35	0	18	12	39	31
L	265+00	0-5	A6(9)	20	32	12	.41	0	4	21	46	29
L	287+00	0-5	A2-4(0)	16	16	0	.00	2	49	21	14	6
L	400+00	0-5	A7-6(12)	24	46	22	.65	0	21	15	30	34

Rock type: Alluvium

Project: 8.14878

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
655+60	0-7	A6(1)	15	26	11	.50	1	46	17	15	22
653+80	4-7	A7-6(14)	15	56	41	1.10	0	37	10	16	37

Rock type: Alluvium

Project: 6.801778

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
121+30	1-5	A4(1)	15	18	3	.17	12	30	35	17	18
122+00	6"-4	A6(8)	23	40	17	.46	0	5	38	20	37
153+75	6"-3	A4(6)	22	32	10	.42	8	19	23	34	24
101+38	1-4	A2-4(0)	16	16	0	.00	2	26	48	18	8
118+00	6"-2	A4(7)	21	26	5	.17	22	8	33	30	29

Rock type: Alluvium Project: 6.801778

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
120+00	1-5	A4(5)	23	29	6	.26	7	12	38	27	23
167+46	1-5	A4(8)	25	26	1	.45	3	6	19	53	22
185+60	2-5	A4(4)	16	18	2	.12	0	4	49	30	17
189+00	1-5	A4(4)	16	24	8	.32	1	20	29	26	25
99+00	1-5	A6(4)	18	31	13	.42	9	19	37	13	31
102+00	1-5	A4(5)	20	29	9	.29	2	18	31	20	31

Rock type: Alluvium Project: 8.14904

	Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
	15+00	0-5	A6(10)	18	36	18	.55	0	8	27	32	33
L^6	44+00	0-12	A7-5(14)	40	60	20	.51	0	6	31	24	39
	123+00	0-5	A4(1)	16	25	9	.41	2	36	24	18	22
L	130+00	0-5	A4(1)	23	31	8	.44	18	21	41	20	18
L	174+00	0-5	A7-6(6)	25	41	16	.57	3	17	37	18	28
L'	606+00	0-5	A6(4)	21	33	12	.46	7	14	40	20	26
L'	608+00	0-5	A4(2)	26	26	0	.00	2	10	55	19	16
L'	610+00	0-5	A6(3)	23	37	14	.48	7	21	38	12	29

Rock type: Ultramafics

Project: 8.14847

Sta.	Depth	AASHO	P.L.	L.L.	P.I.	Act.	CA	CS	FS	Si	Cl
92+00	6-13	A7-6(20)	28	77	49	.72	0	5	12	17	66
231+00	10-25	A7-5(7)	31	43	12	.26	1	15	22	16	47
231+00	25-35	A7-5(6)	30	41	11	.33	2	19	24	24	33
234+00	15-25	A4(5)	23	33	10	.38	0	12	34	28	26
235+00	6-13	A7-5(17)	42	65	23	.38	1	5	13	21	61