TEXAS
WATER
DEVELOPMENT
BOARD

REPORT 36

COMPARATIVE RESULTS OF SEDIMENT SAMPLING WITH THE TEXAS SAMPLER AND THE DEPTH-INTEGRATING SAMPLERS and SPECIFIC WEIGHT OF FLUVIAL SEDIMENT DEPOSITS IN TEXAS

JANUARY 1967

TEXAS WATER DEVELOPMENT BOARD

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COMPARATIVE RESULTS OF SEDIMENT SAMPLING WITH THE TEXAS SAMPLER AND THE DEPTH-INTEGRATING SAMPLERS

and

SPECIFIC WEIGHT OF FLUVIAL SEDIMENT DEPOSITS IN TEXAS

By

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FOREWORD

On September 1, 1965 the Texas Water Commission (formerly, before February 1962, the State Board of Water Engineers) experienced a far-reaching realignment of functions and personnel, directed toward the increased emphasis needed for planning and developing Texas' water resources and for administering water rights.

Realigned and concentrated in the Texas Water Development Board were the investigative, planning, development, research, financing, and supporting functions, including the reports review and publication functions. The name Texas Water Commission was changed to Texas Water Rights Commission, and responsibility for functions relating to water-rights administration was vested therein.

For the reader's convenience, references in this report have been altered, where necessary, to reflect the current (post September 1, 1965) assignment of responsibility for the function mentioned. In other words credit for a function performed by the Texas Water Commission before the September 1, 1965 realignment generally will be given in this report either to the Water Development Board or to the Water Rights Commission, depending on which agency now has responsibility for that function.

Texas Water Development Board

John J. Vandertulip
Chief Engineer

COMPARATIVE RESULTS OF SEDIMENT SAMPLING WITH

THE TEXAS SAMPLER AND THE DEPTH-INTEGRATING SAMPLERS

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COMPARATIVE RESULTS OF SEDIMENT SAMPLING WITH THE TEXAS SAMPLER AND THE DEPTH-INTEGRATING SAMPLERS

INTRODUCTION

Investigations of the amounts of suspended sediment transported by Texas streams began before 1900 when sediment data were collected for the Rio Grande near El Paso. In 1924 the U.S. Department of Agriculture, in cooperation with the Texas Water Development Board, began collecting suspended-sediment data at several points on the Brazos River and its tributaries. Gradually the program was expanded to cover other river basins. At the present time most of the major streams in Texas are being sampled for suspended sediment by the Texas Water Development Board. Information on monthly and annual sediment loads, in acre-feet and in tons, has been published since 1940 by the Texas Water Development Board in a series of reports: "The Silt Load of Texas Streams."

Since 1949 the U.S. Geological Survey has measured suspended-sediment concentration and particle-size distribution at a number of daily stations, and has collected total sediment discharge data at some of these stations and at several non-daily stations. The data are published annually in U.S. Geological Survey Water-Supply Papers: "Quality of Surface Waters of the United States," Parts 7 and 8.

Different methods of sediment sampling are used by the Texas Water Development Board and by the U.S. Geological Survey primarily because the sediment samplers used by the two agencies are different in construction and operation. Since the beginning of the cooperative program between the Department of Agriculture and the Texas Water Development Board in 1924, suspended-sediment samples have been collected by the Board with the Texas sampler. This sampler collects a sample of the water-sediment mixture, usually at one point in the vertical near the water surface, in a narrow-mouth bottle that is held vertically in the sampler. The Geological Survey uses the U.S. standard depth-integrating samplers which collect a sample of the water-sediment mixture while being lowered and raised through the vertical at a constant transit rate. The water-sediment mixture enters the depth-integrating sampler through a nozzle, which is oriented into the streamflow, at a velocity about equal to that of the stream.

Knowledge of the comparison of results obtained with the two types of samplers is needed so that past and future sediment records derived from the

Texas sampler can be correlated with those derived from the U.S. standard samplers.

Purpose and Scope of Study

The major objective of this study was to learn, from a comparison of results obtained with the two samplers, whether a coefficient or coefficients can be determined which, when applied to the suspended-sediment concentration in samples collected near the surface with the Texas sampler, will approximate the concentration in samples collected with the U.S. depth-integrating samplers.

Suspended-sediment samples for comparison were collected during the period September 1, 1961 to August 31, 1963. Most of these samples were collected at stations where the Texas Water Development Board is currently collecting sediment data with the Texas sampler. Samples were collected at a few other sites to give a better overall comparison of the samplers. Eight suspended-sediment samples for comparison were preferred at each station, and when possible the samples were collected over a broad range of water discharges. Low runoff during the study period, however, prevented the collection of sufficient data at some stations. Data collected in 1950-51 for a similar sediment study by George Porterfield of the U.S. Geological Survey are included as supplementary data in this report (Porterfield, written communication, 1951).

Particle-size analyses were determined for some of the suspended-sediment samples collected with depth-integrating samplers and with the Texas sampler (Table 3 in Appendix B). Table 3 also includes particle-size analyses of suspended-sediment samples collected by the U.S. Geological Survey at a number of other locations in Texas.

Prior Investigations

An investigation of different types of sediment samplers and sampling methods was made by the U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation (1941), and the results were published in Report No. 3 of the series, "Measurement and Analysis of Sediment Loads in Streams." To ascertain the best sampler and the optimum method of sampling a stream, the investigators experimented with samplers having vertical and horizontal intakes, collected sediment samples at points throughout the vertical, and determined the vertical velocity, roughness coefficients, and other significant parameters. These researchers concluded that the true mean sediment concentration usually cannot be determined by sampling at a single point near the surface because the depth at which the mean sediment concentration occurs varies with particle size and with the characteristics of the stream. They also concluded that sampling at or near the surface yields large negative errors in sediment concentration for all streams except those transporting predominantly clay particle sizes. The investigators further determined that the depth-integration method, whereby the sampler fills at a rate equal to the velocity at every point in the vertical and traverses at least 95 percent of the stream depth, will give results most closely approximating the true mean sediment concentration.

The U.S. Army Corps of Engineers, Tulsa, Oklahoma District, made an investigation of the Texas-type sampler and the U.S. D-43 depth-integrating samplers to determine their relative accuracy in sampling streams that transport a high percentage of clay. The resultant report concluded: "These tests show a definite tendency for the Texas-type sampler to collect more of the clay sizes than does the D-43 sampler, or conversely, that the Texas-type sampler captures fewer sand and silt particles" (U.S. Army Corps of Engineers, 1949, p. 3).

In 1950 an investigation similar to that of the U.S. Army Corps of Engineers was begun in Texas by George Porterfield of the Geological Survey. Porterfield studied the difference in sediment samples collected from Texas streams by means of the Texas sampler and the depth-integrated samplers. Because an extended drought precluded collection of adequate data, no positive conclusions were made at the time.

COMPARISON OF THE TEXAS SAMPLER WITH THE DEPTH-INTEGRATING SAMPLERS

Vertical Distribution of Suspended Sediment

Sediment transported by flowing water may be classified as suspended load and bed load. The suspended load is the only classification of load which will be of concern in this report. The suspended load (suspended sediment) is sediment that is supported by the upward components of turbulent currents or by colloidal suspension if the sediment particles are very small (Colby, 1964, p. VI).

The way in which suspended sediment is distributed in the vertical should be understood in order to compare the results obtained with the depth-integrating samplers and with the Texas sampler. The concentration of suspended sediment increases from the water surface to the streambed. The upward components of turbulent currents tend to lift the sediment particle into suspension. The concentration of sediment at any given point in the vertical will depend on the individual grain size of the sediment and the force of the upward currents. A depth-integrating sediment sampler is designed to collect an integrated sample of sediment and water in a vertical so that when the quantity of sediment in the sample, expressed as concentration, is multiplied by the product of mean velocity and depth of the vertical the result is the suspended-sediment discharge per unit width. The U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation (1941, p. 77) stated: "A sampler which fills at a rate equal to the velocity at every point in the vertical and which will traverse 95 percent of the depth, or more, gives the most accurate results." The mean sediment concentration may be approximated by collecting a sediment sample at one point in the vertical and applying the proper coefficient. However, the selection of the proper coefficient is very difficult because the coefficient will vary according to the stream characteristics and to the particle-size distribution of the sediment.

The following discussion states the difficulties involved in selecting the proper coefficients, the wide range of coefficients, and a method of computing the mean suspended-sediment concentration in a vertical from point samples. The discussion is taken from the U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation (1941).

Figure 1 is a nomograph from which coefficients may be derived to obtain the mean suspended-sediment concentration in a vertical from a sediment sample

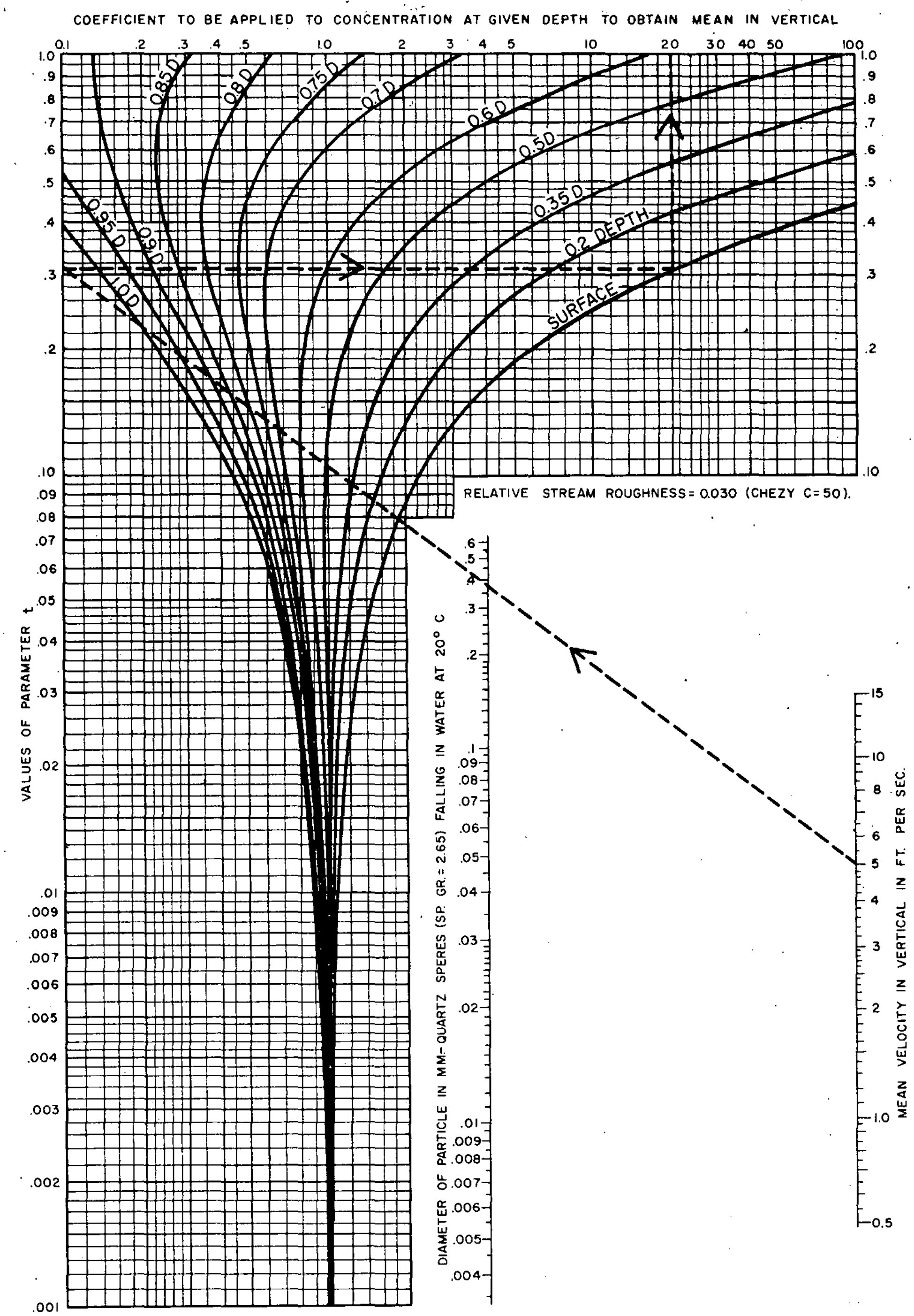

Figure 1

Coefficients to Determine Mean Sediment Concentration in a Vertical from a Sample at a Single Depth

(from U. S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation, 1941, p. 72)

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collected with a point sampler. The nomograph is drawn for a relative stream roughness of 0.030 (Chezy C of 50). For every change in the relative stream-roughness factor, a new nomograph must be constructed. The coefficient that is used to adjust the individual particle sizes of a point sample varies with the parameter _t_ (Figure 1). The parameter _t_ is an index of vertical sediment distribution. The nomograph reveals that the parameter _t_ varies with the relative stream roughness, with the particle size of the sediment, and with the mean velocity in the vertical. If a sample is collected near the surface the coefficient is large for a considerable range of conditions. This characteristic indicates that, although a coefficient may be applied to the concentration of a surface sample, collecting a single sample from the upper portion of a vertical is inadvisable when the sediment and velocity distributions are of considerable curvature. When this type of distribution is present, the sample should be collected between the 0.5 and 0.7 depths where the coefficients are close to 1.0.

Table 1 presents an example of computations in which coefficients are applied to correct the concentrations of the individual grain sizes.

Table 1.--Example of computations to correct the size distribution for a sample from a single point by the application of a coefficient

Given: The particle-size distribution and sediment concentration (columns 1 through 3, below) of a sediment sample collected on September 15, 1961, on the Sabine River near Bon Wier, using the Texas (surface) sampler.

Assume: Mean velocity in vertical = 5 feet per second.

The relative stream roughness = 0.030 (Chezy C = 50).

Diameter of particle in mm. (Mean diameter of given size range)	Percent of sample in size range	Concentration of size range (ppm)	Coefficient from Figure 1	Corrected concentration (ppm) (Col. 3 times Col. 4)
0.37	0.4	2	20	40
.18	2.2	11	2.6	29
.092	12.2	62	1.4	87
.047	10.6	53	1.1	58
.023	9.8	49	1.01	49
.012	6.9	35	1.00	35
.0059	5.1	26	1.00	26
.0028	11.5	58	1.00	58
.0020	41.3	208	1.00	208
Total	100.0	504		590

Description of Samplers

The Texas sampler consists of a 1/8- by 3/4- by 15-inch hanger bar to which a sheet-metal bottle holder is fastened. The hanger bar is fastened to a 15-pound lead current-meter weight (Figure 2). When the sampler is used, an 8-ounce small-mouth bottle is placed in a vertical position in the bottle holder and is lowered one foot below the surface of the stream. The sampler is brought to the surface when air bubbles cease to come from the bottle.

The depth-integrating samplers used in this study ranged in weight from 24 to 100 pounds (Figure 2). These samplers have a cast bronze streamlined body in which the sample container is enclosed. The nose of the sampler is drilled and tapped for intake nozzles of 1/4-, 3/16-, and 1/8-inch diameters. An exhaust port is located on the side of the head of the sampler. Integrally-cast tail vanes orient the sampler in the streamflow. All depth-integrating samplers use 1-pint round milk bottles for sample containers. The depth-integrating sampler continuously accumulates a sample of the water-sediment mixture by moving vertically at a constant rate and by admitting the water-sediment mixture at a velocity equal to that of the stream through the nozzle, which is oriented upstream. Some depth-integrating samplers collect a water-sediment mixture within 0.3 foot of the streambed; others collect samples within 0.5 foot of the streambed. The depth-integrating samplers used in this study were the U.S. D-43, U.S. P-46, U.S. D-49, and U.S. DH-59 depth-integrating samplers. For information on other samplers of this type see U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation (1959).

Comparison of Results Obtained by Texas Sampler with Those Obtained by Depth-Integrating Sampler

On the basis of a study by Faris (1933), the Texas Water Development Board uses a coefficient of 1.102 to correct the sediment data collected with the Texas sampler. Faris concluded that the mean suspended-sediment concentration generally occurred at the 0.6 depth and that if the concentration of a sample collected near the surface is multiplied by the factor of 1.102 the results would equal the mean concentration for the vertical.

A comparison of the suspended-sediment data collected with the Texas sampler and with a depth-integrating sampler indicates that no single coefficient can be used for all streams in Texas. The greatest variation between the results obtained with the two types of samplers is for the sand-bed streams of southeast Texas. The concentrations of suspended-sediment samples collected with the Texas sampler from streams in east and southeast Texas differ greatly from the concentrations of suspended-sediment samples collected with a depth-integrating sampler. The ratio of suspended-sediment concentrations collected with a depth-integrating sampler to the suspended-sediment concentrations collected with the Texas sampler ranged from 0.96 to 3.41. The suspended load of the Sabine, Neches, lower Trinity, and San Jacinto Rivers contains a high percentage of sand (averages about 48 percent in the Sabine River near Bon Wier). More than 30 percent of the suspended-sediment load of the Neches, Trinity, and San Jacinto Rivers is sand. The concentrations of samples collected with the Texas sampler from the sandy streams must be multiplied by a coefficient greater than 1.102. Data collected for these streams show that neither a coefficient nor a set of coefficients could be computed to correct data collected with the Texas sampler.

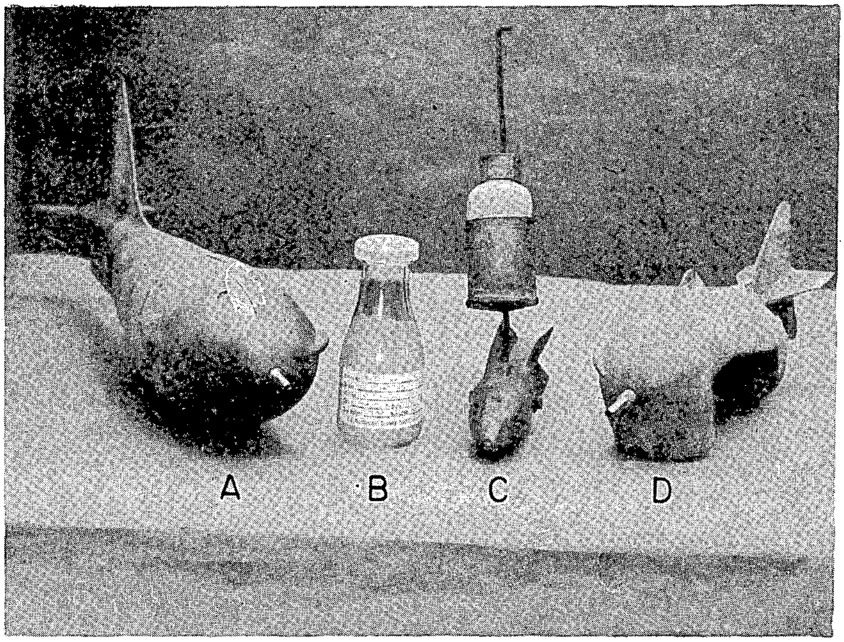

Figure 2

U. S. Depth-Integrating Samplers and Texas Sampler

A. U. S. D-49 depth-integrating sampler

B. Sample bottle used in A and D

C. Texas sampler

D. U. S. DH-59 depth-integrating sampler

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To illustrate that no single coefficient can be applied to the sediment samples collected with the Texas sampler to obtain the mean sediment concentration of a stream, suspended-sediment samples were collected with both the Texas sampler and a depth-integrating sampler. The resulting sediment concentrations from the Texas sampler were divided into the sediment concentrations from the depth-integrating sampler to obtain coefficients. These coefficients were plotted against water discharge. Figure 9 is an example of how wide a range the coefficients can have. The Trinity River at Romayor is a sandy stream. This is the probable cause of the wide range of coefficients. Figure 10 shows that the depth-integrating sampler collects approximately 35 percent sand and the Texas sampler collects approximately 8 percent sand at this station. For information on the range of coefficients for the locations that were studied see Appendix A.

For streams carrying higher percentages of silt and clay in suspension, the coefficients for correcting the suspended-sediment concentrations of samples collected with the Texas sampler are nearer unity than those for sandy streams. The Brazos River carries a large suspended-sediment load, but the percentage of sand is less than that of either the silt and clay fractions. For example, the sediment load of the Brazos River near South Bend averages about 12 percent sand, 24 percent silt, and 64 percent clay; the ratios of suspended-sediment concentrations obtained by the two samplers ranged from 1.02 to 1.49. Most of the computed ratios were less than 1.102. At Richmond the suspended-sediment load averages about 18 percent sand, 30 percent silt, and 52 percent clay; the ratios of suspended-sediment concentrations obtained by the two samplers ranged from 0.98 to 1.50. At the Richmond station the suspended-sediment concentrations of most of the samples collected with the Texas sampler differed from the mean sediment concentration determined with a depth-integrating sampler by a ratio greater than 1.102. The fine sediment particles (silt and clay) were almost uniformly distributed throughout the vertical at South Bend and Richmond but the concentration of sand increased with depth. Although the percentage of sand in suspension in the Brazos River is not high, the percentage of sand is highly variable near the surface where samples are collected with the Texas sampler. Therefore no single coefficient can be assigned for correcting sediment data collected with the Texas sampler at South Bend and Richmond or probably at intermediate sites.

The range of ratios between the results obtained by the two samplers is not large for streams where sand makes up less than 10 percent of the suspended-sediment load. Such stream stations are the Double Mountain Fork Brazos River near Aspermont, Leon River at Gatesville, Colorado River near San Saba, San Antonio River at Goliad, and Nueces River near Three Rivers. Because the suspended-sediment load of these streams consists largely of silt and clay, the suspended-sediment concentration is nearly uniform throughout the vertical and the concentration of a sediment sample collected near the surface approximates the mean sediment concentration.

To illustrate how the data collected with the Texas sampler is affected by sand in suspension, the sand percentages of depth-integrated sediment samples are plotted against the ratio of sediment concentrations of depth-integrated samples to the sediment concentrations of samples collected near the surface with the Texas sampler (Figure 3). The points on the graph correlate fairly well up to about 40 percent sand in suspension. The range of ratios between

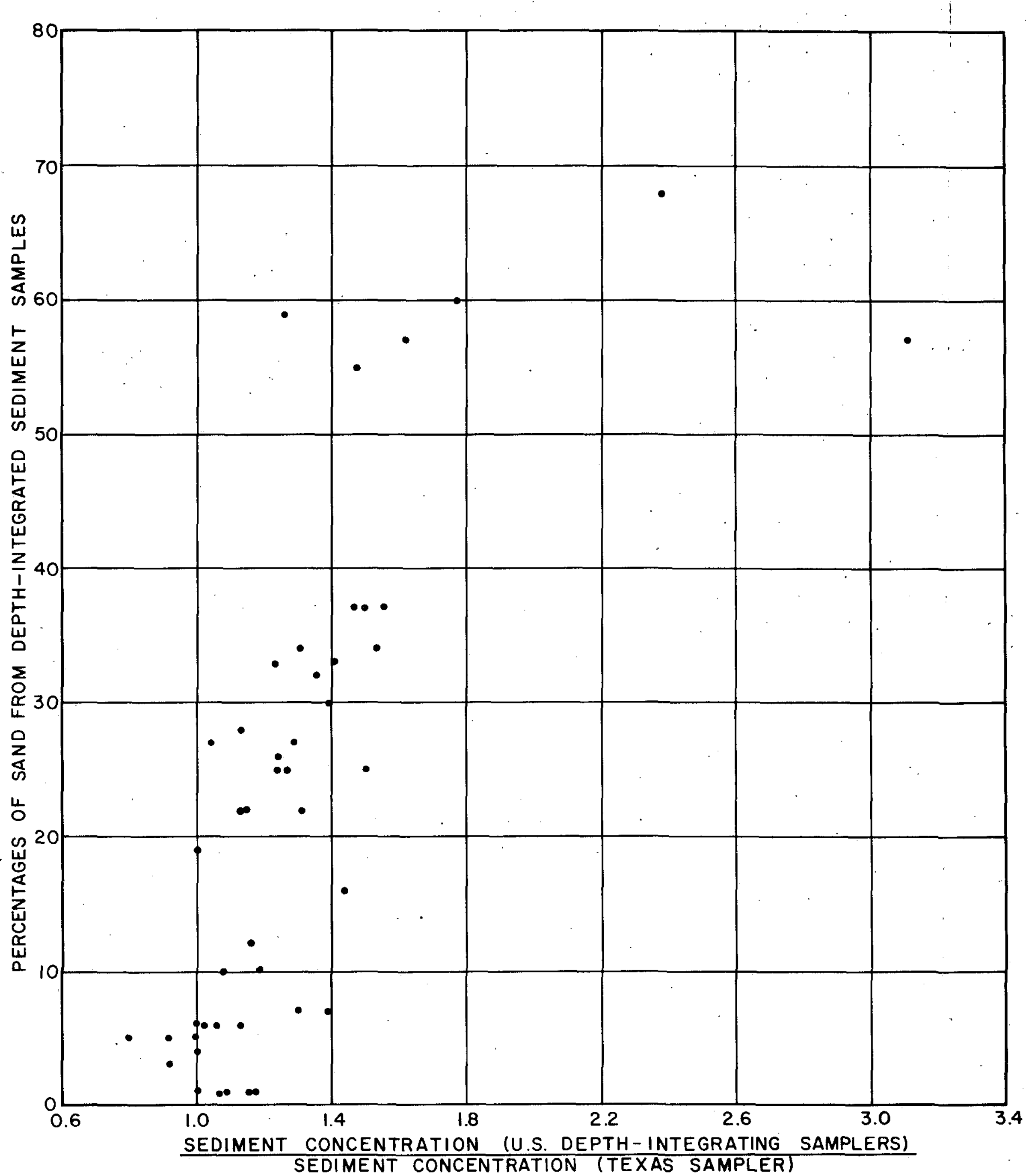

Figure 3

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Percentages of Sand from Depth-Integrated Sediment Samples

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the two types of samplers for suspended-sand percentages from 0 to 40 was from 0.8 to 1.6. A coefficient of 0.8 to 1.6 would have to be applied to the sediment concentration of a sample collected with the Texas sampler in order to obtain the mean sediment concentration of the vertical. Above 40 percent sand in suspension the points were widely scattered and the ratios of the two samplers ranged from 1.26 to 3.10.

SUMMARY AND CONCLUSIONS

Suspended-sediment samples were collected with the Texas sampler and depth-integrating samplers in all the major river basins in Texas except the Red River and Rio Grande. Results showed that suspended-sediment samples collected with the Texas sampler from streams that carried a high percentage of sand (such as the Sabine, Neches, San Jacinto, lower Trinity, and lower Brazos Rivers) were not representative of the mean suspended-sediment concentration of the streams. Furthermore, the ratio of the suspended-sediment concentration of samples collected by the depth-integrating samplers to the suspended-sediment concentration of samples collected by the Texas sampler varied over such a wide range on these sandy streams that no single coefficient could be applied to the concentrations collected by the Texas sampler to obtain a mean concentration. On streams in which less than 10 percent of the suspended sediment is sand, the difference between the sediment concentrations collected by the two types of samplers is not large; a single coefficient can be computed for these streams to apply to the sediment concentration collected by the Texas sampler in order to obtain the mean sediment concentration of the stream. The depth-integrating samplers should be used on streams in which 10 percent or more of the suspended sediment is sand.

The results of the study also indicate that:

1. Additional comparison data should be collected for stations having insufficient data so as to provide a more definitive comparison between the two types of samplers.

2. Additional samples should be collected for particle-size analyses at stations where only a limited number of samples have been collected.

3. More than one vertical should be sampled in a cross section on streams where the suspended sediment is not evenly distributed throughout the cross section.

DEFINITION OF TERMS

Bedload is the sediment that moves by sliding, rolling, or skipping on or very near the streambed and is supported mainly by the bed rather than by the turbulence of flow (Colby, 1964, p. V).

Chezy C is the friction coefficient which is equal to $\frac{1.5}{n/D^{1/6}}$, where

n = Manning roughness coefficient
and D = depth of the stream, in feet.

Concentration is a ratio of the weight of sediment to the weight of the water-sediment mixture (Colby, 1964, p. V).

Depth-integrating sampler is a sampling device that continuously accumulates a water-sediment mixture by moving vertically at a constant transit rate and by admitting the water-sediment mixture at a velocity about equal to the stream velocity at every point of the sampler's travel.

Particle-size classification is the classification recommended by the American Geophysical Union Subcommittee on sediment terminology (Lane and others, 1947, p. 937). According to this classification, clay-size particles have diameters between 0.0002 and 0.004 mm, silt-size particles have diameters between 0.004 and 0.062 mm, and sand-size particles have diameters between 0.062 and 2.0 mm.

Relative roughness is equal to $n/D^{1/6}$, where
n = Manning roughness coefficient
and D = depth of the stream, in feet.

Suspended load (suspended sediment) is sediment that is supported by the upward components of turbulent currents or by colloidal suspension if the sediment particles are very small (Colby, 1964, p. VI).

Texas sampler is a sampling device that collects a water-sediment mixture at one point in the vertical by the mixture flowing into a narrow-mouth bottle positioned in a vertical position.

Total sediment discharge. Weight of all sediment passing a section in a unit of time.

Vertical is an imaginary line from the surface of the stream to the streambed.

REFERENCES

Colby, B. R., 1964, Discharge of sands and mean-velocity relationships in sand-bed streams: U.S. Geol. Survey Prof. Paper 462-A, 47 p.

Faris, O. A., 1933, The silt load of Texas streams: U.S. Dept. Agr. Tech. Bull. 382, 71 p.

Lane, E. W., and others, 1947, Report of the subcommittee on sediment terminology: Am. Geophys. Union Trans., v. 28, no. 6, p. 936-938.

U.S. Army Corps of Engineers, 1949, Second interim progress report on sedimentation investigations in Tulsa District, Arkansas and Red River basin, February 1949: Tulsa, Okla. Dist., 65 p.

U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation, 1941, Analytical study of methods of sampling suspended sediment: U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation Rept. 3, Iowa City, Iowa, 82 p.

______ 1959, Federal Inter-Agency sedimentation instruments and reports: U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation, Minneapolis, Minn., 38 p.

APPENDIX A

SUMMARIES OF DATA COLLECTED AT 15 STATIONS

Sabine River at Logansport, La.

The streamflow station on the Sabine River at Logansport (8-0225) is 4,600 feet upstream from the bridge on U.S. Highway 84. (In the following pages the number in parentheses after a station name is the serial number assigned to the station by the U.S. Geological Survey. The number identifies the station in the national network.) Streamflow records are available from 1903 to the present. The Texas Water Development Board established a sediment station at the bridge in 1932. The sediment station was discontinued in 1933, was reestablished in 1935, and is still in operation. The U.S. Geological Survey has periodically collected sediment data for the Bureau of Reclamation for use in the planning of the Bureau's Texas Basins Project.

Suspended-sediment samples were collected with the Texas sampler and a depth-integrating sampler for comparison. (See Table 2 of Appendix B.) The ratios of the concentrations collected by the depth-integrating sampler to the concentrations collected by the Texas sampler ranged widely (Figure 4).

The velocity of the Sabine River at Logansport is low and the concentration of suspended sediment is low. Of the 5 dual sets of samples collected for comparison of the 2 types of samplers, only 1 sample had a concentration greater than 100 ppm. Some of the variation between the concentrations of samples collected by the two samplers could have been due to the technique of analyzing the concentration of the small quantity of sediment. However, because the Sabine River is a sand-carrying stream, the suspended sediment will not be uniformly distributed throughout the vertical, and the distribution will vary with time. Computing a coefficient to adjust the sediment concentration of the surface samples to the mean sediment concentration of the stream would therefore be difficult if not impossible. Two of the dual sediment samples were analyzed for the sand-size distribution. (See Table 3 of Appendix B.)

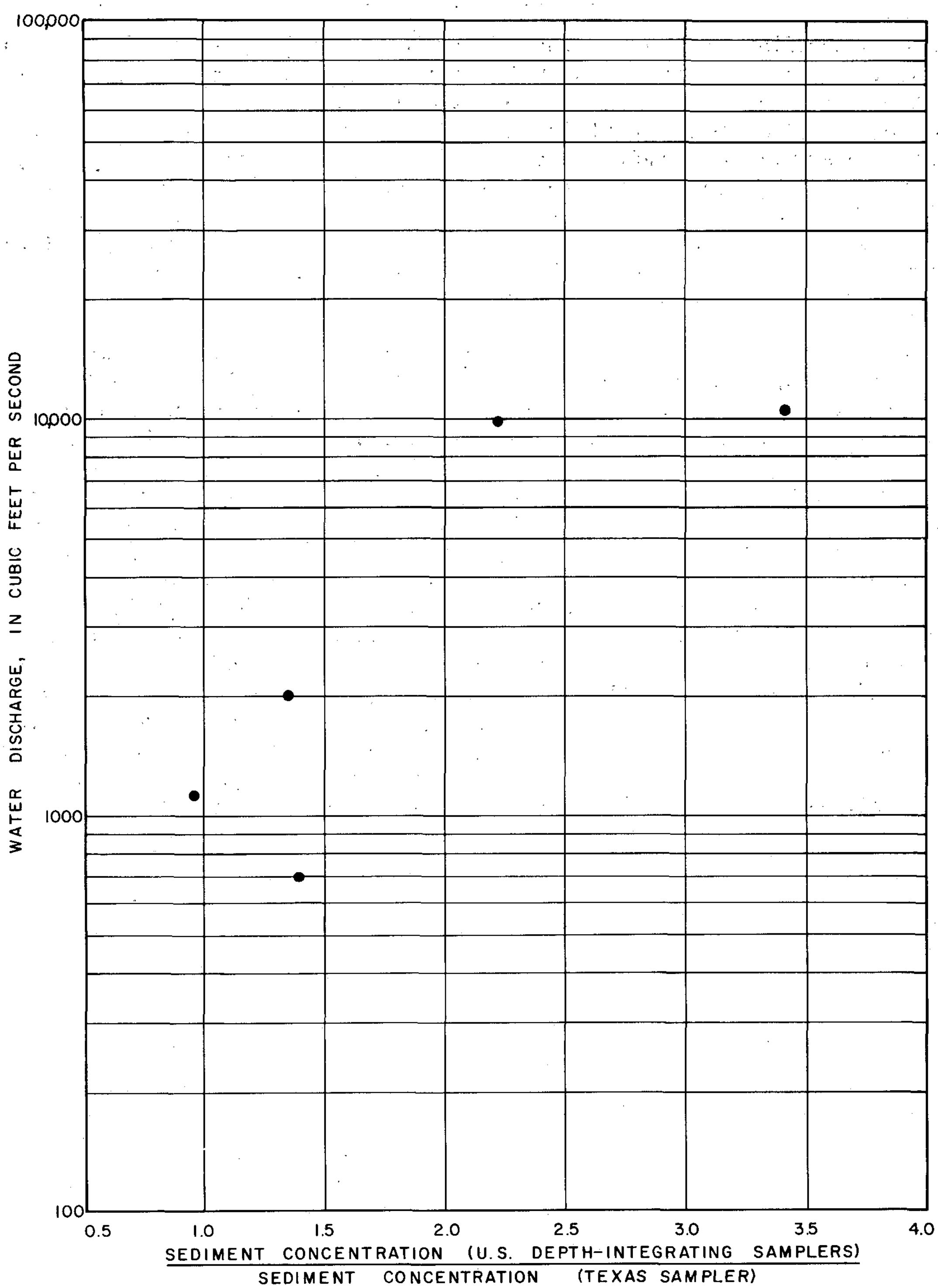

Figure 4

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Sabine River at Logansport, La.

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Sabine River near Bon Wier, Tex.

The streamflow station on the Sabine River near Bon Wier (8-0285) is at the bridge on State Highway 63. Streamflow records date back to 1923, but sediment data have been collected only periodically since 1957. A few sediment discharge measurements for computation of total load were made between 1957 and 1959 for use in planning the Texas Basins Project of the Bureau of Reclamation. Four dual sets of suspended-sediment samples were collected in 1961 and 1962 for comparison of the two types of samplers. (See Table 2.) The ratios of the concentrations of samples collected by depth-integrating samplers to the concentrations of samples collected by the Texas sampler ranged from 1.25 to 2.37. No correlation exists between the ratios and water discharge (Figure 5).

All four sets of samples were analyzed for the sand-size distribution and are listed in Table 3. The size distribution (Figure 6) indicates that the percent sand collected by the Texas sampler is about 18 percent less than that collected by depth integration.

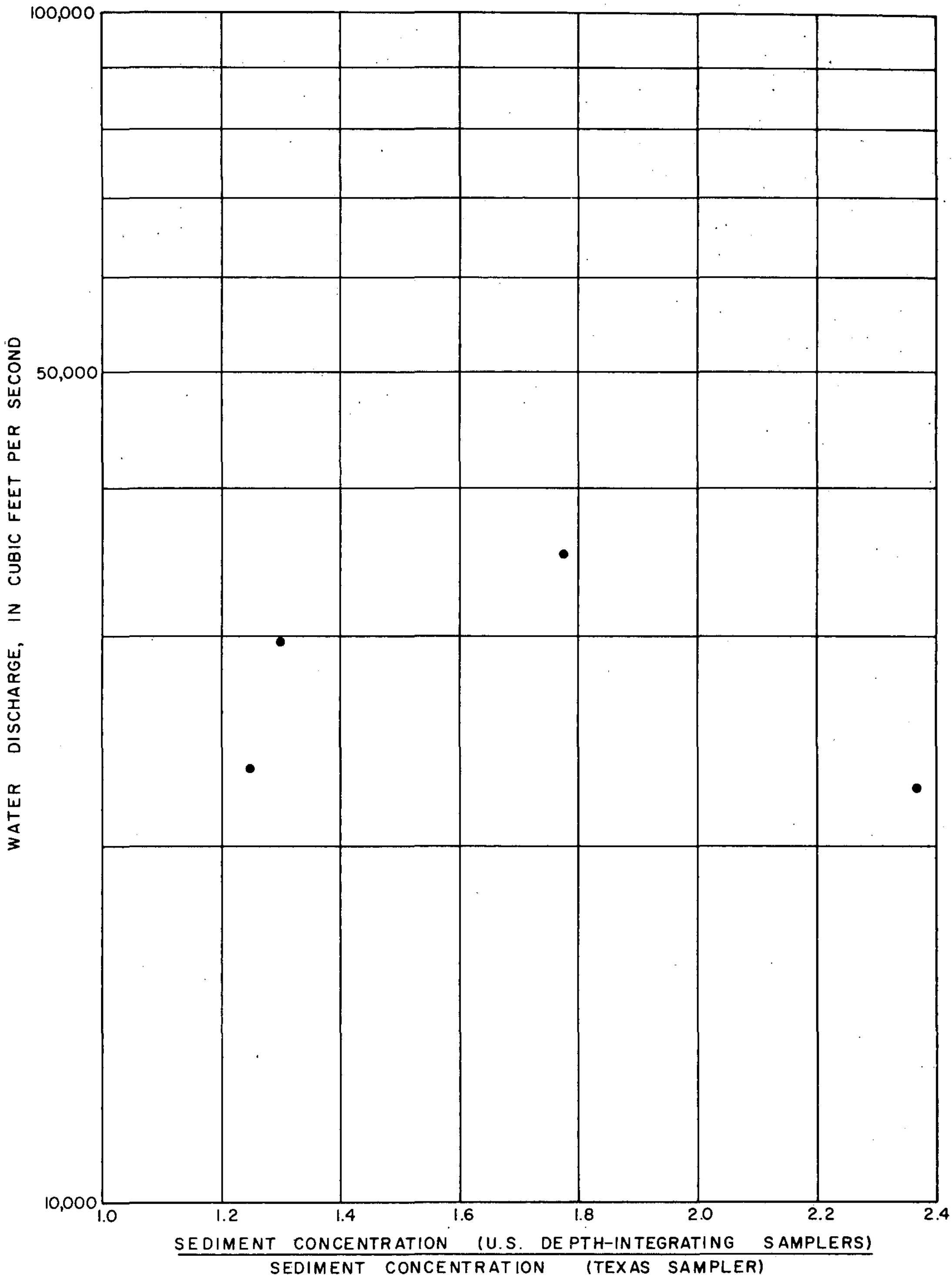

Figure 5

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Sabine River near Bon Weir, Tex.

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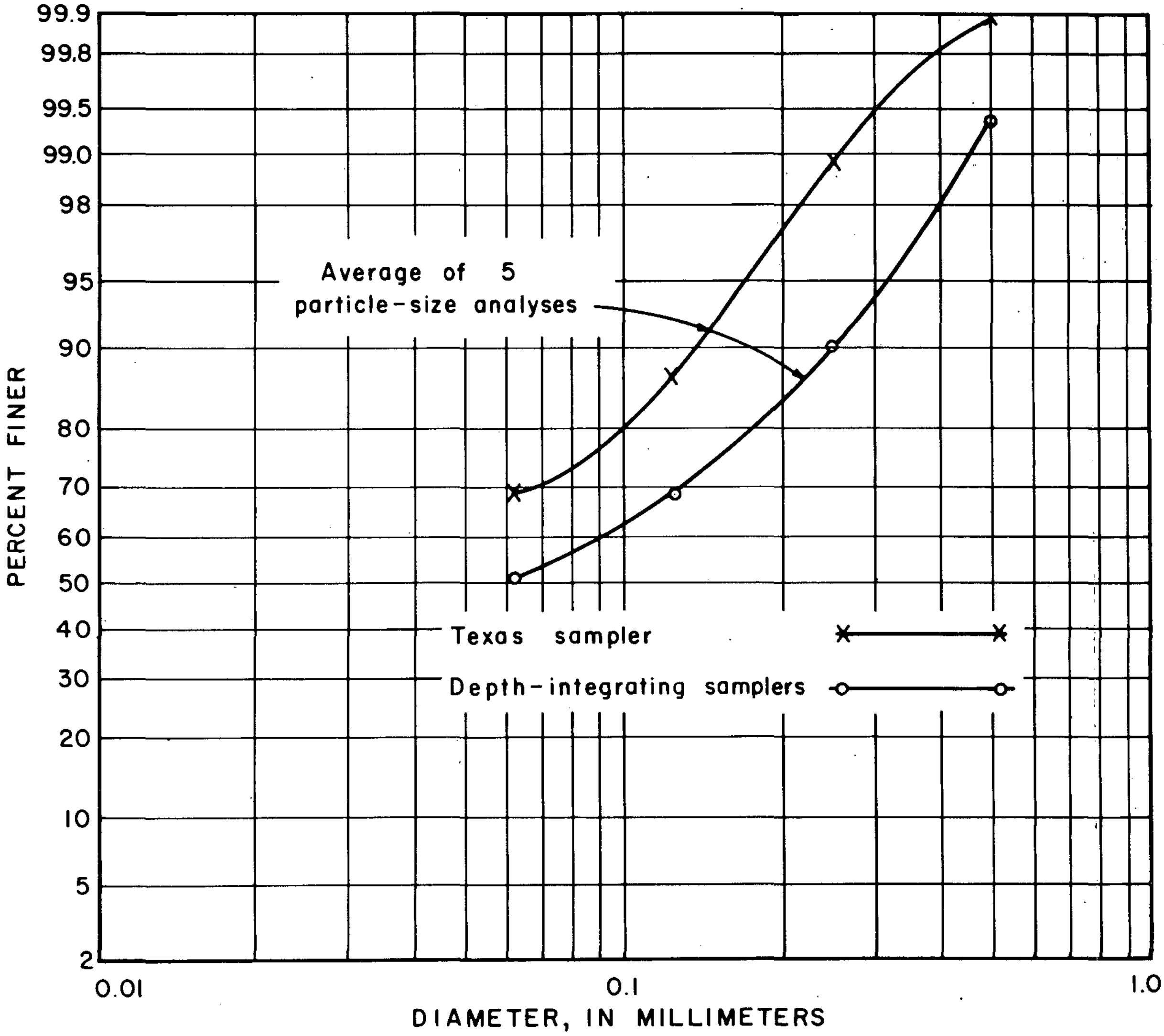

Figure 6

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Sabine River near Bon Wier, Tex.

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Neches River near Rockland, Tex.

The streamflow station on the Neches River near Rockland (8-0335) is 2,200 feet downstream from the bridge on U.S. Highway 69 and 1 mile north of Rockland. Streamflow data have been collected at this station since 1903. The Texas Water Development Board has collected sediment data since 1930. Four dual sets of suspended-sediment samples were collected in 1961 and 1962 for comparison of the Texas sampler and the depth-integrating samplers. Figure 7 gives the relation of the ratios of sediment concentrations of samples collected by the two types of samplers to water discharge. The ratios, which ranged from 1.05 to 2.40, have no correlation to water discharge.

Three sets of samples were analyzed for sand-size distribution. (See Table 3.) The averages of the particle-size analyses (Figure 8) indicate that the percent sand collected by the depth-integrating samplers is about 20 percent more than that collected by the Texas sampler.

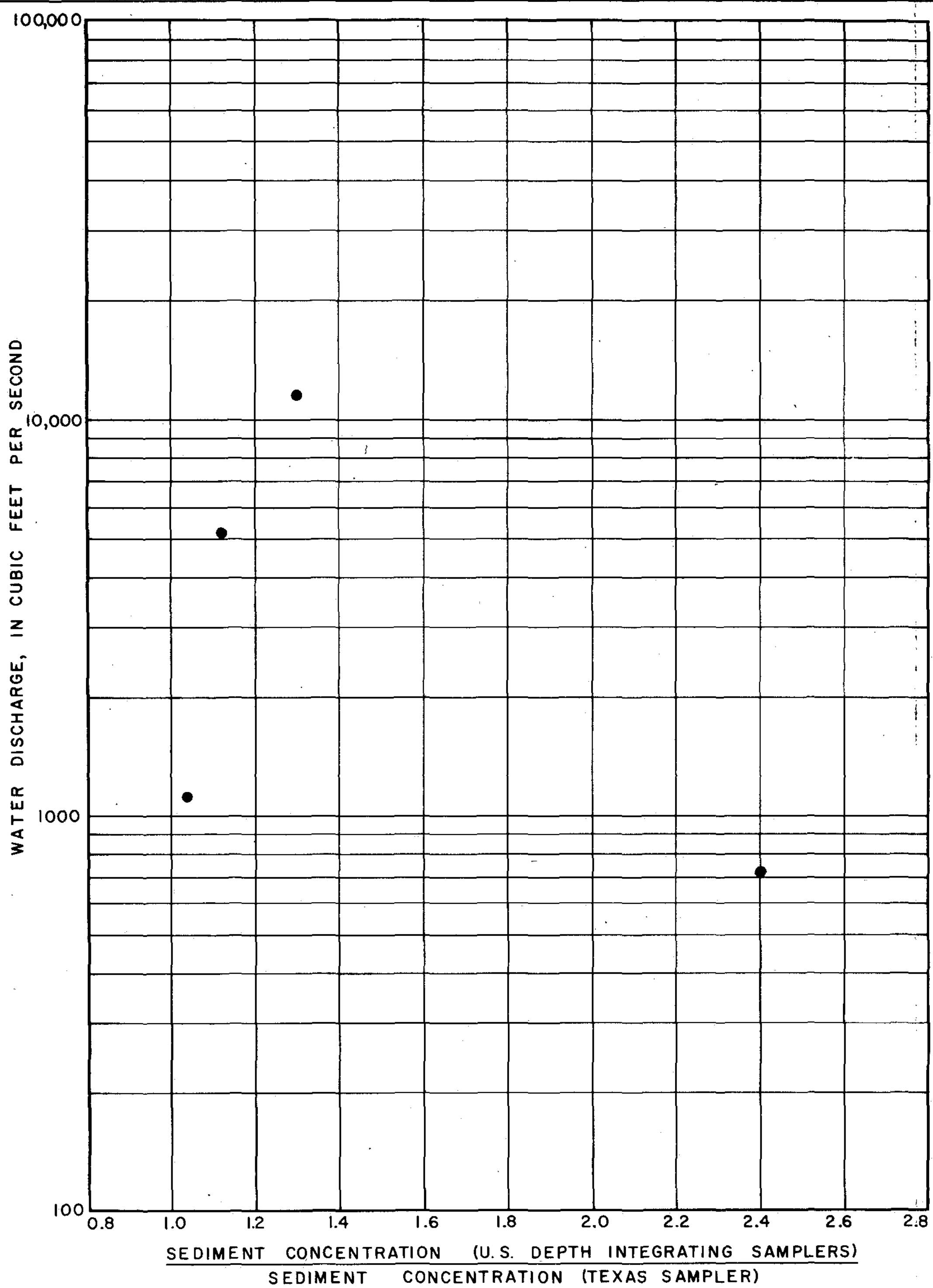

Figure 7

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Neches River near Rockland, Tex.

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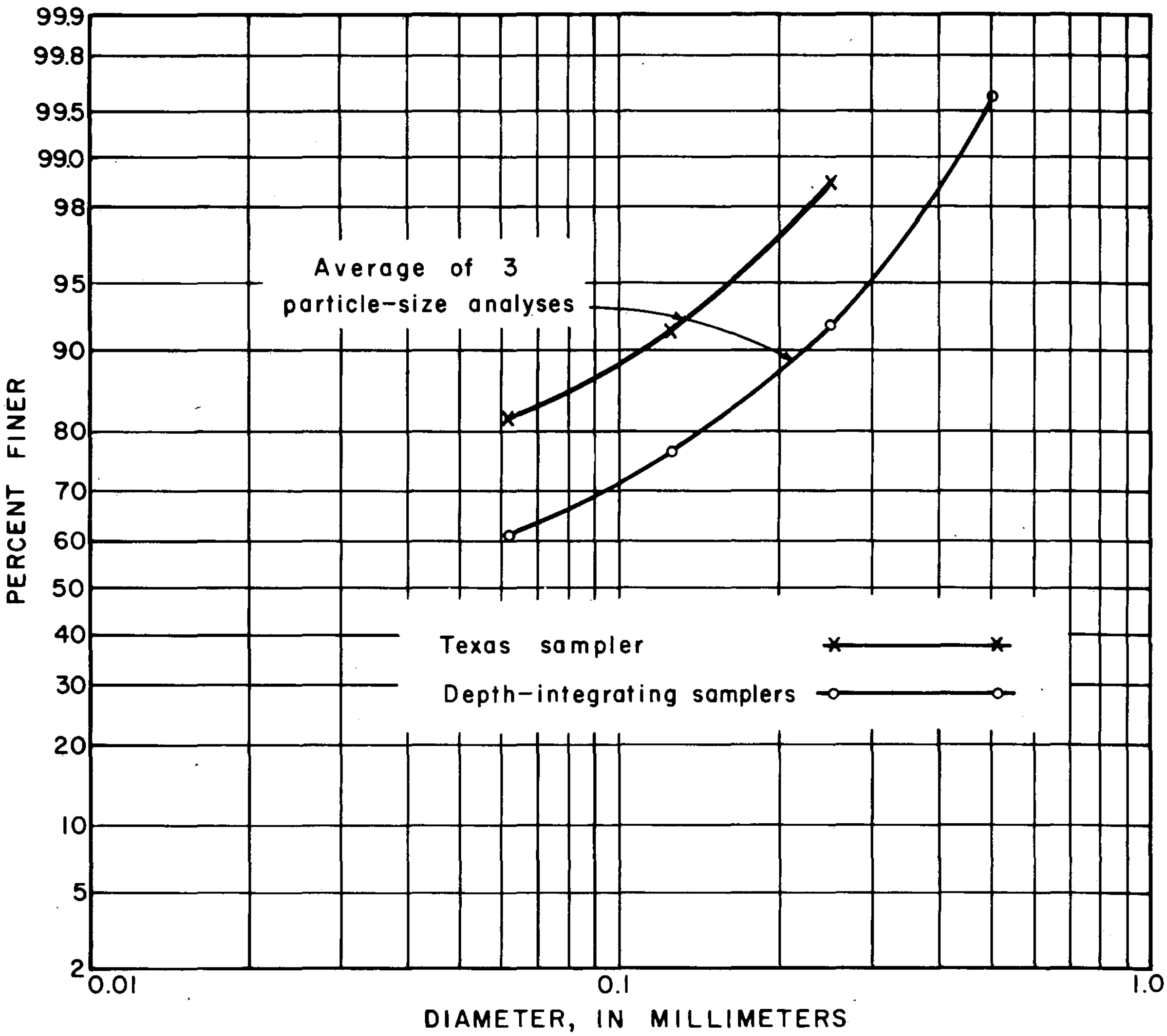

Figure 8

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Neches River near Rockland, Tex.

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Trinity River at Romayor, Tex.

The streamflow station on the Trinity River at Romayor (8-0665), which has been in operation since 1924, is at the bridge on State Highway 105 and is 1.9 miles south of Romayor. Since 1936 sediment data have been collected here by the Texas Water Development Board. To compare the two types of samplers the U.S. Geological Survey made periodic total-sediment-discharge measurements and collected suspended-sediment samples with each type of sampler. Thirteen sets of suspended-sediment samples for comparison were collected during 1961 and 1962 (Table 2).

The samples were collected with both types of samplers at discharges ranging from 3,600 to 30,800 cfs, and had suspended-sediment concentrations (for the depth-integrated samples) of 421 to 1,240 ppm. The ratios, ranging from 1.06 to 1.55, were plotted against water discharge (Figure 9). Obviously, there is no correlation between water discharges and ratios.

Eleven sets of samples were analyzed for particle-size distribution (Table 3). The average of these analyses shows that the depth-integrating sampler will collect a higher percentage of suspended sand than will the Texas sampler. The Texas sampler collects approximately 8 percent sand while the depth-integrating sampler collects approximately 35 percent (Figure 10).

The vertical distribution of suspended sediment, determined by collecting point samples, is illustrated by two examples in Figure 11. For September 20, 1962, the suspended-sediment concentration was relatively constant throughout the upper 0.8 of depth; but from 0.8 of depth to the streambed the turbulence increases the suspended-sediment concentration about 82 percent. The vertical distribution for September 18, 1962, shows about a 35 percent increase in sediment concentration from the surface to the streambed. These two examples clearly illustrate why the Texas sampler collects less material than the depth-integrating sampler. Because of the variations, especially in the lower part of the vertical, no single coefficient can be used to adjust the sediment concentrations of samples collected with the Texas sampler at this station.

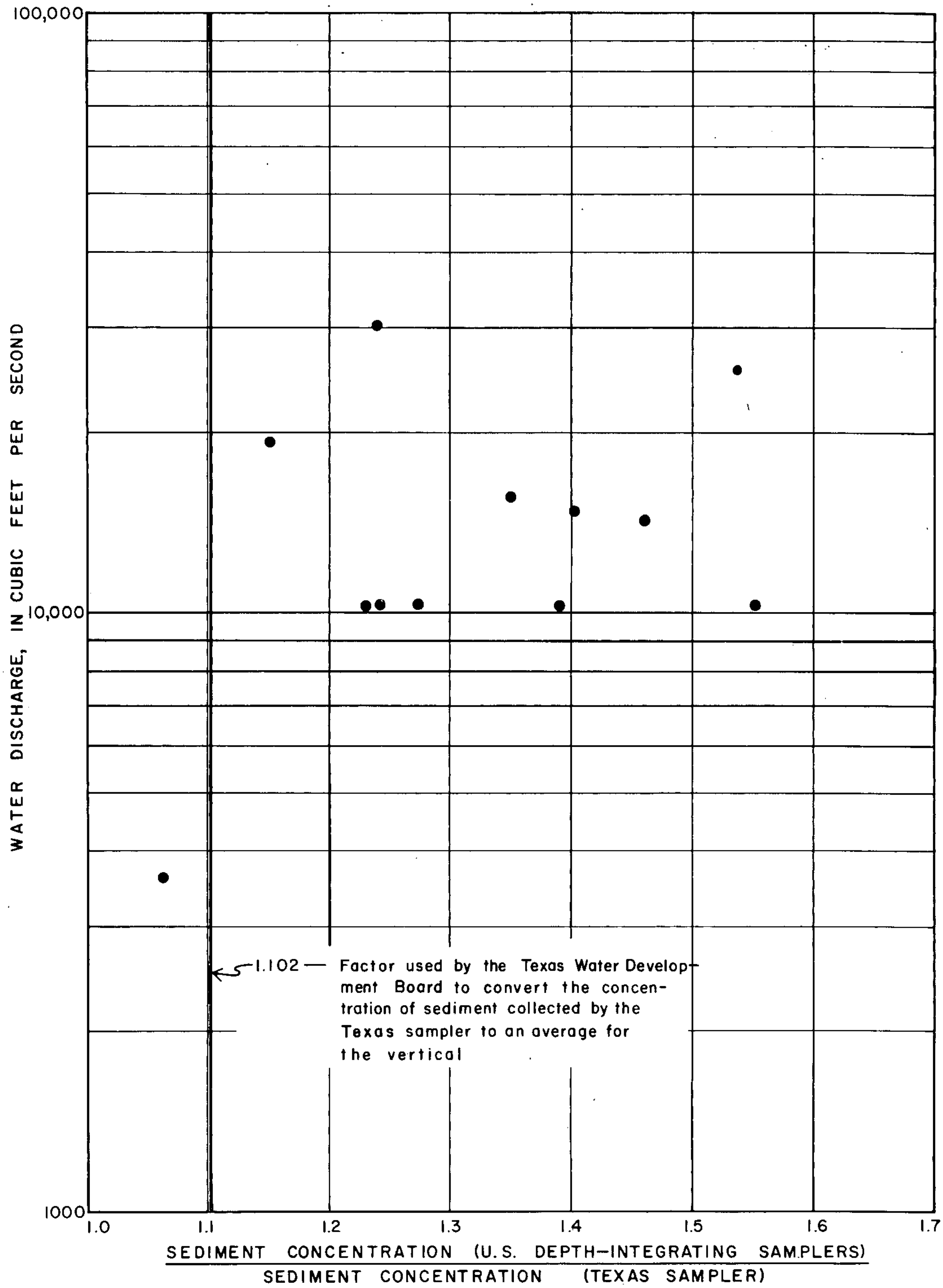

Figure 9

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Trinity River at Romayor, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

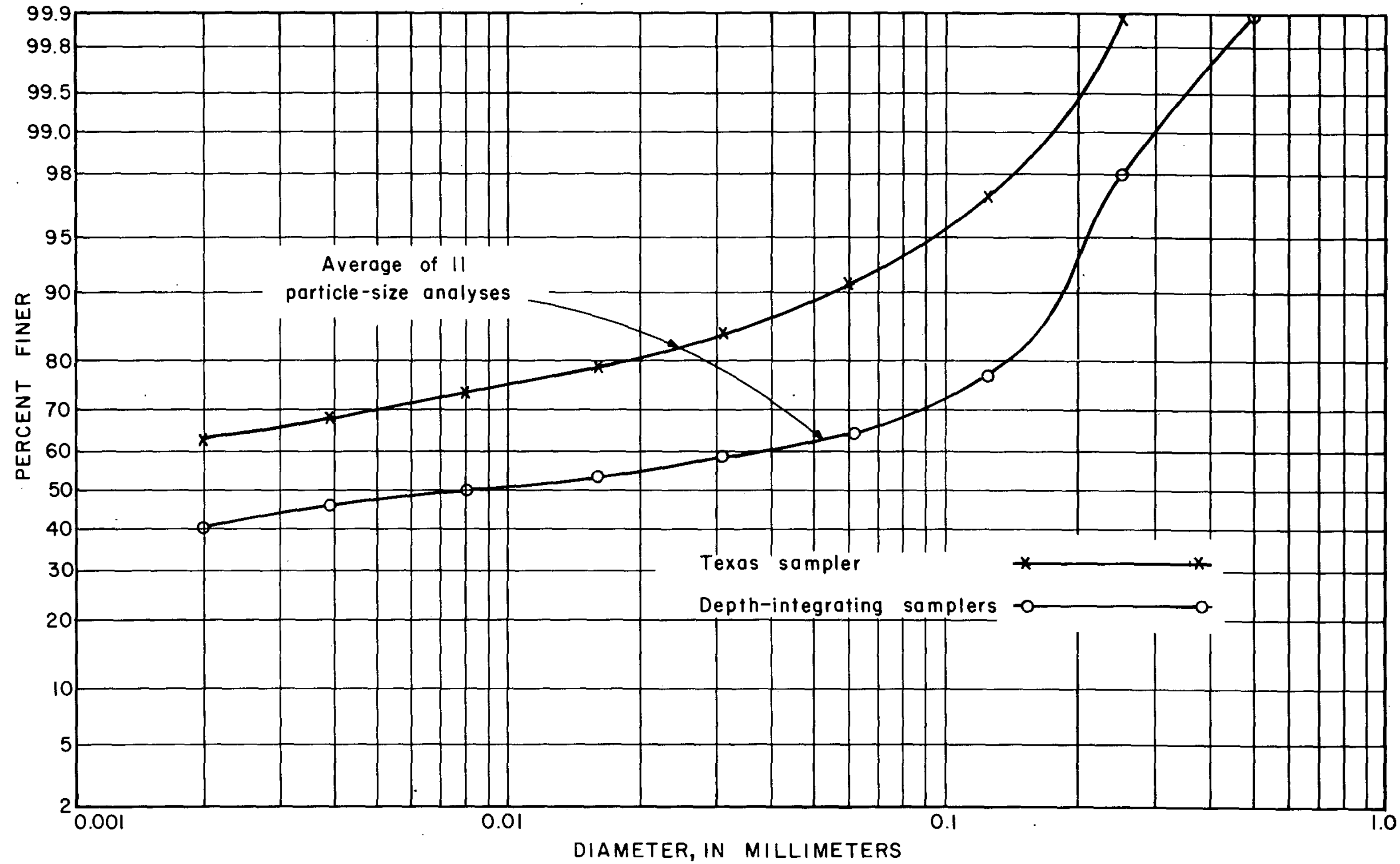

Figure 10

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Trinity River at Romayor, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

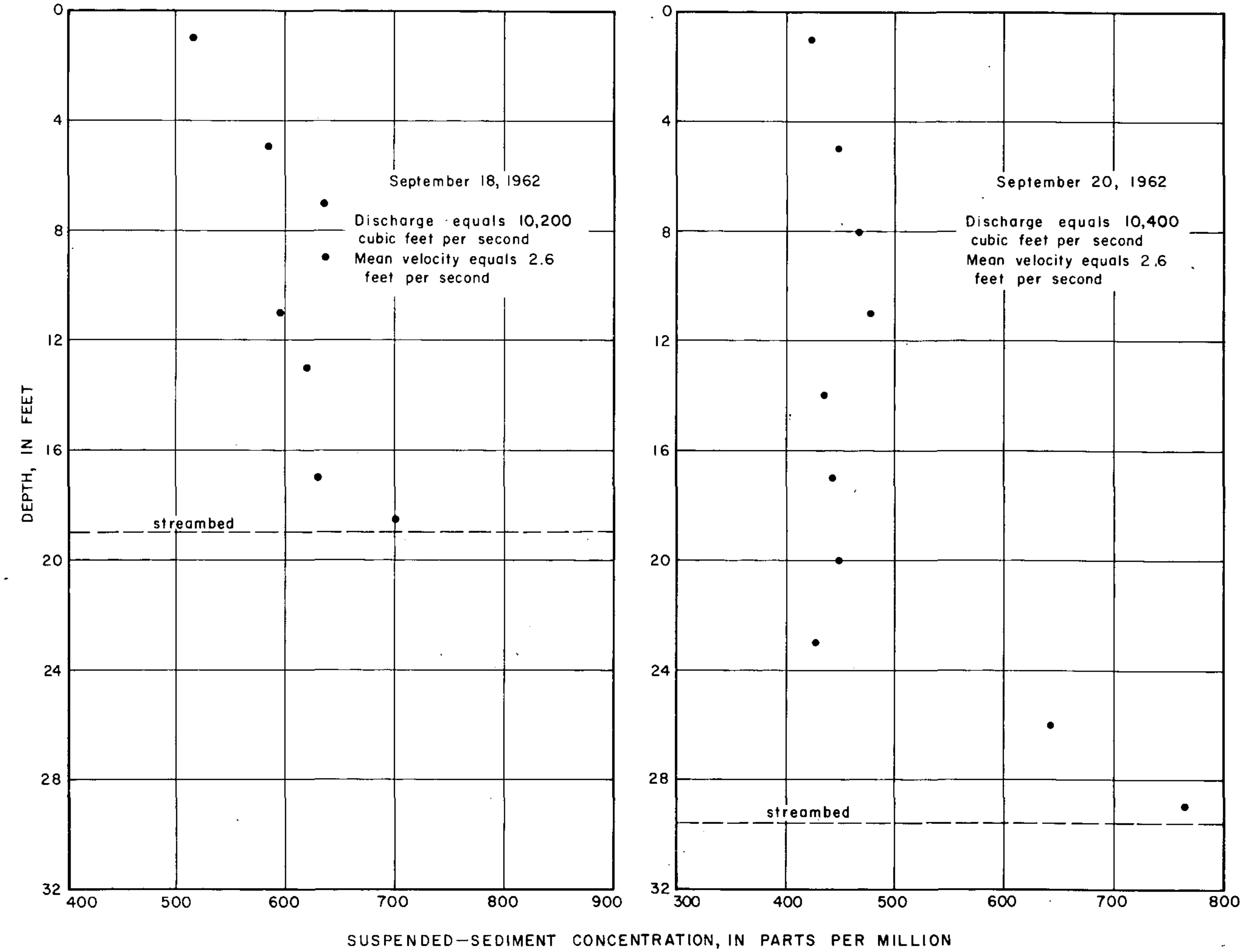

Figure 11

Vertical Distribution of Suspended-Sediment Concentration of the Trinity River at Romayor, Tex., September 18 and 20, 1962

U. S. Geological Survey in cooperation with the Texas Water Development Board

West Fork San Jacinto River near Conroe, Tex.

The streamflow station on the West Fork San Jacinto River near Conroe (8-0680) is at the bridge on U.S. Highway 75 and is 4-1/4 miles south of Conroe, Texas. The station, established in 1924, was discontinued in 1927. It was reestablished in 1939, and operation has continued to the present. The Texas Water Development Board established a sediment station here in 1952 to replace the one on the San Jacinto River near Humble, Texas.

Eight sets of suspended-sediment samples were collected during 1961 and 1962 for comparison of the two types of samplers (Table 2). Because the San Jacinto River transports a high percentage of sand, a sediment sample collected near the surface will not represent the mean sediment concentration. This fact is shown by Figure 12, a graph of the ratios of sediment concentrations collected by depth-integrating samplers to the sediment concentrations collected by the Texas sampler plotted against water discharge. The coefficients, which range from 1.00 to 1.61, have no relation to stream discharge.

Seven sets of the samples were analyzed for particle-size distribution in the sand-size range (Table 3). The averages of the particle-size analyses (Figure 13) indicate that the depth-integrating samplers collected 12 percent more sand than did the Texas sampler.

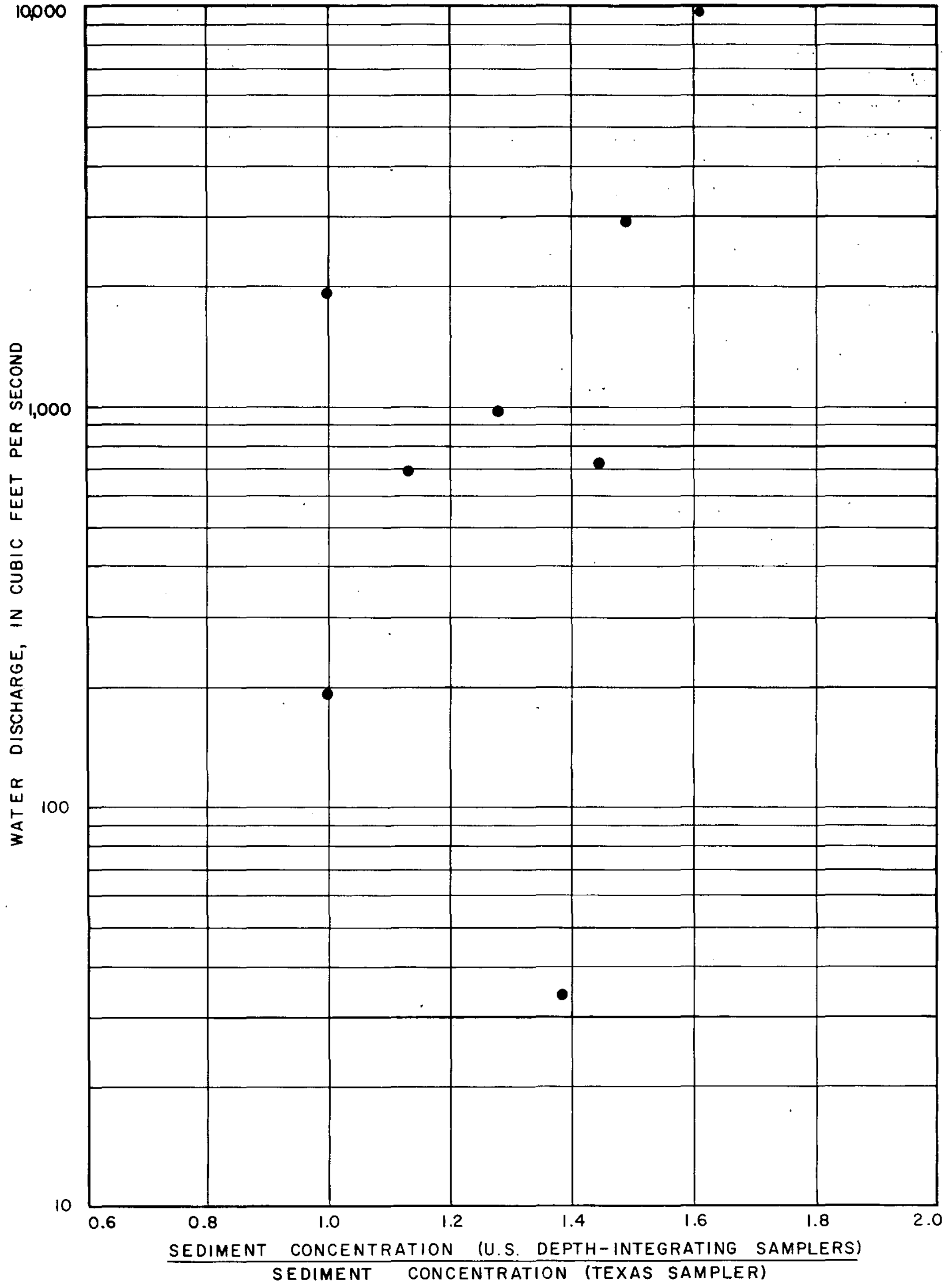

Figure 12

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, West Fork San Jacinto River near Conroe, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

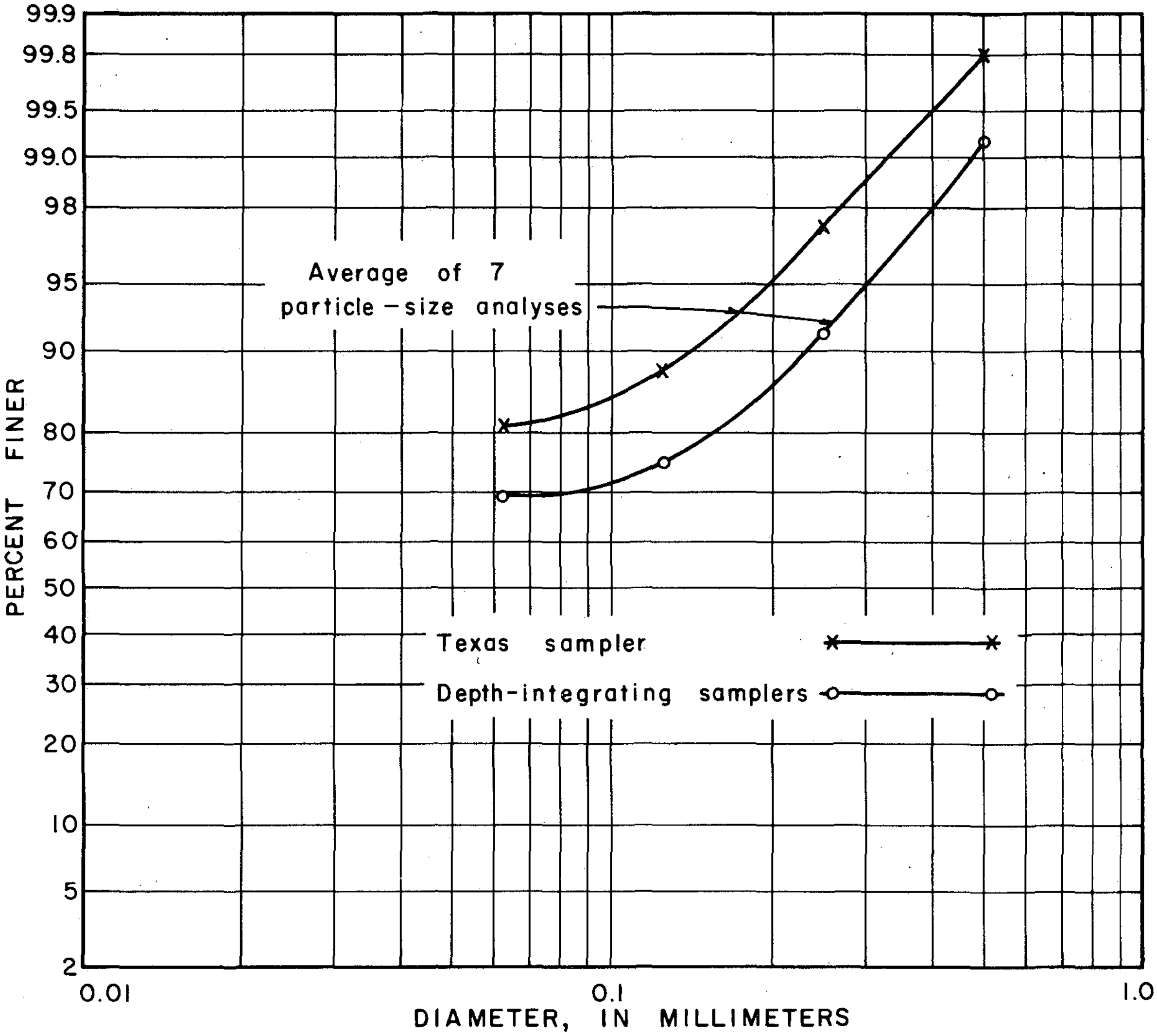

Figure 13.

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, West Fork San Jacinto River near Conroe, Tex.

U.S. Geological Survey in cooperation with the Texas Water Development Board

Double Mountain Fork Brazos River near Aspermont, Tex.

The streamflow station on the Double Mountain Fork Brazos River near Aspermont (8-0805) is at the bridge on U.S. Highway 83 and is 10 miles south of Aspermont. Except during water years 1935-39, the streamflow station has been operating continuously since 1923. (Data and illustrations for this station were taken from a written communication by George Porterfield, 1953). A sediment station was operated here by the Texas Water Development Board from 1924-33 and by the U.S. Geological Survey from 1949-51. Data comparing the two types of samplers were collected during 1951 (Table 2). The sediment concentrations collected by the depth-integrating samplers have been plotted against those by the Texas sampler (Figure 14); a 45° line on the graph is a line of equal sediment concentration. As illustrated by Figure 14, the sediment concentrations collected by the two types of samplers are indeed very similar.

Six sets of sediment samples for comparison were analyzed for size distribution (Table 3), and averages of 5 of them were plotted (Figure 15). Both the sediment concentration and the distribution of particle size appeared to be equally distributed throughout the vertical. Of the 11 sets of comparison samples collected, only 1 had a ratio greater than 1.10; the majority had a ratio of less than 1.03. A coefficient of about 1.02, if applied to concentrations obtained at this station with the Texas sampler, should give results correct within about 5 or 6 percent.

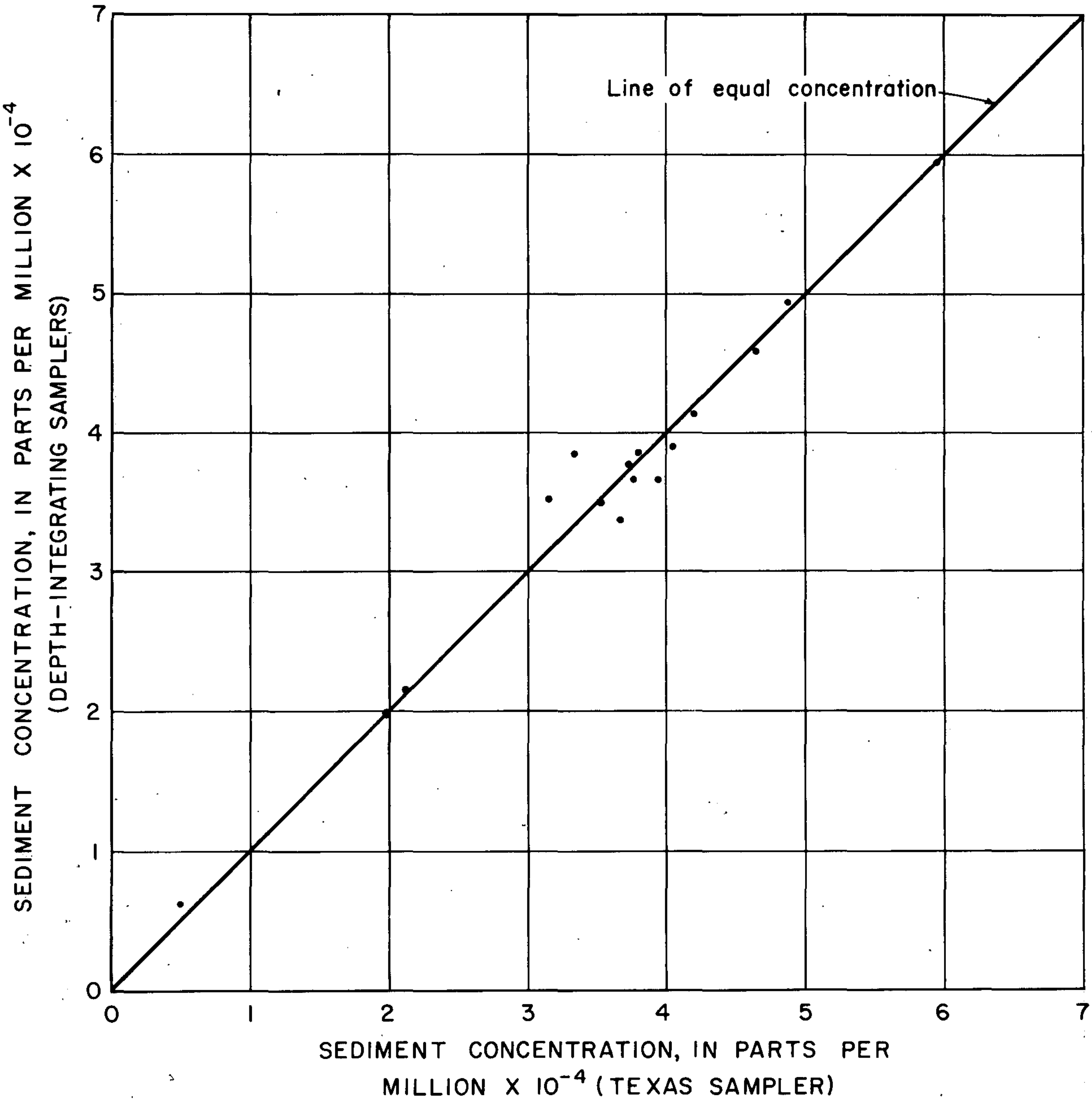

Figure 14

Comparison of Sediment Concentration from the Texas Sampler and from the Depth-Integrating Samplers, Double Mountain Fork Brazos River near Aspermont, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

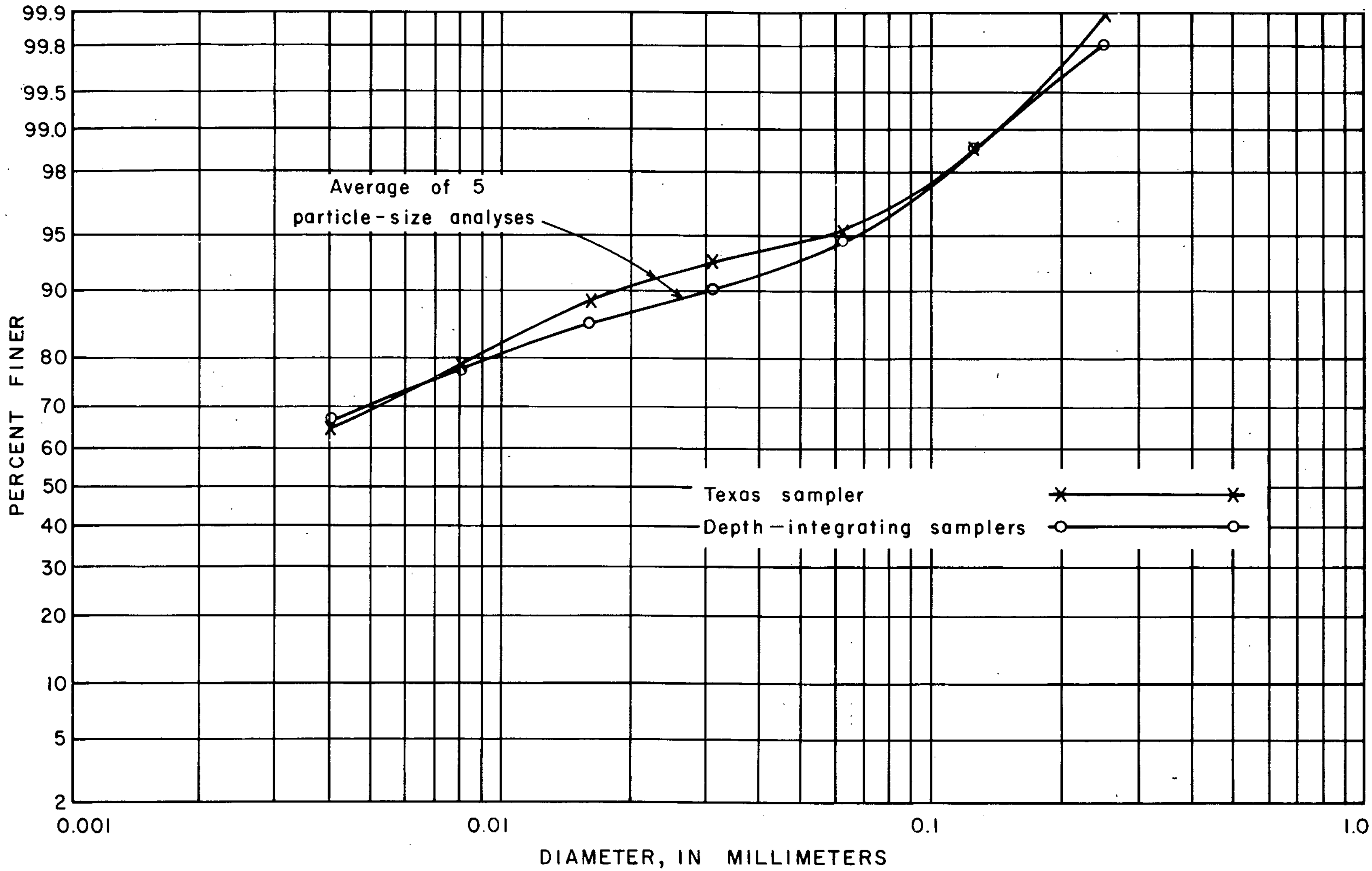

Figure 15

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Double Mountain Fork Brazos River near Aspermont, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

Brazos River near South Bend, Tex.

The South Bend streamflow station (8-0880) is upstream from Possum Kingdom Reservoir at the bridge on State Highway 67 and is 2 miles northeast of South Bend. In 1942 a sediment station was established here by the Texas Water Development Board to study the suspended-sediment inflow to the Possum Kingdom Reservoir. Streamflow data have been collected at this site since 1938.

Nine sets of sediment samples were collected for comparison of the Texas sampler and the depth-integrating samplers. The water discharge ranged from 1,240 to 42,900 cfs, and the suspended-sediment concentration of the depth-integrated samples ranged from 3,140 to 8,670 ppm (Table 2). The ratios between the sediment concentrations collected by the two types of samplers were plotted against water discharge (Figure 16); the ratios, which ranged from 1.02 to 1.49, had no relation to water discharge.

Six sets of the samples for comparison were analyzed for particle-size distribution (Table 3). The averages of the particle-size distributions for the samples collected with the depth-integrating sampler showed that the suspended-sediment samples consisted of 64 percent clay, 24 percent silt, and 12 percent sand, while those collected with the Texas sampler consisted of 70 percent clay, 26 percent silt, and 4 percent sand. Figure 17 indicates that the depth-integrating samplers collect a greater percentage of sand than the Texas sampler.

The vertical distribution of suspended sediment, determined by collecting point samples, is shown in Figure 18. Figure 18 shows that the suspended-sediment concentration increases from the surface to the streambed. This increase in suspended-sediment concentration is due to an increase of suspended-sand particles at lower depths. On June 12, 1962, when the water discharge was 12,600 cfs the suspended-sediment concentration ranged from about 5,400 ppm near the surface to about 6,400 ppm near the streambed, an increase of about 19 percent. On September 9, 1962, when the water discharge was 42,900 cfs, the suspended-sediment concentration ranged from about 2,600 ppm near the surface to about 6,600 ppm near the streambed, an increase of about 155 percent.

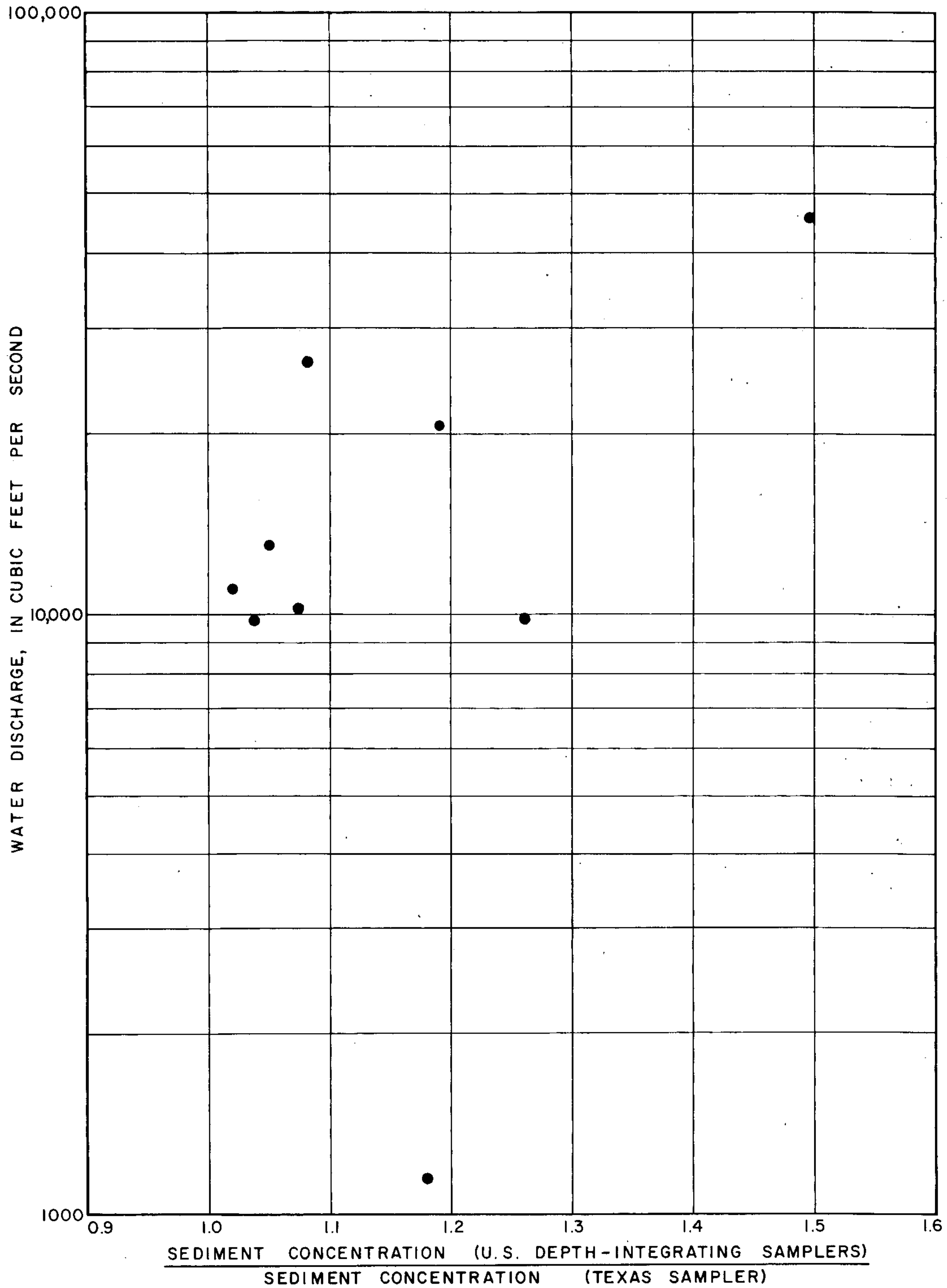

Figure 16

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Brazos River near South Bend, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

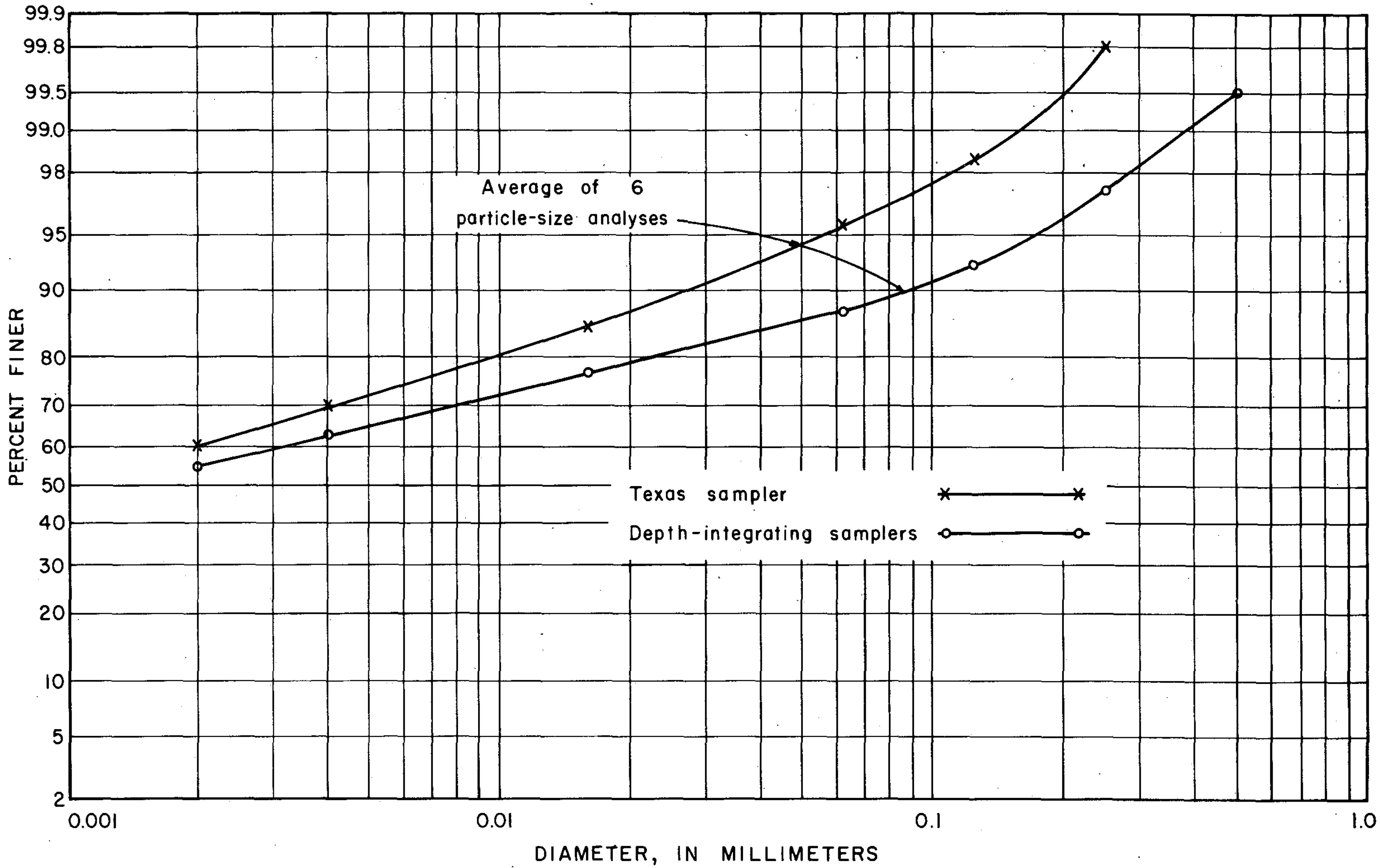

Figure 17

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Brazos River near South Bend, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

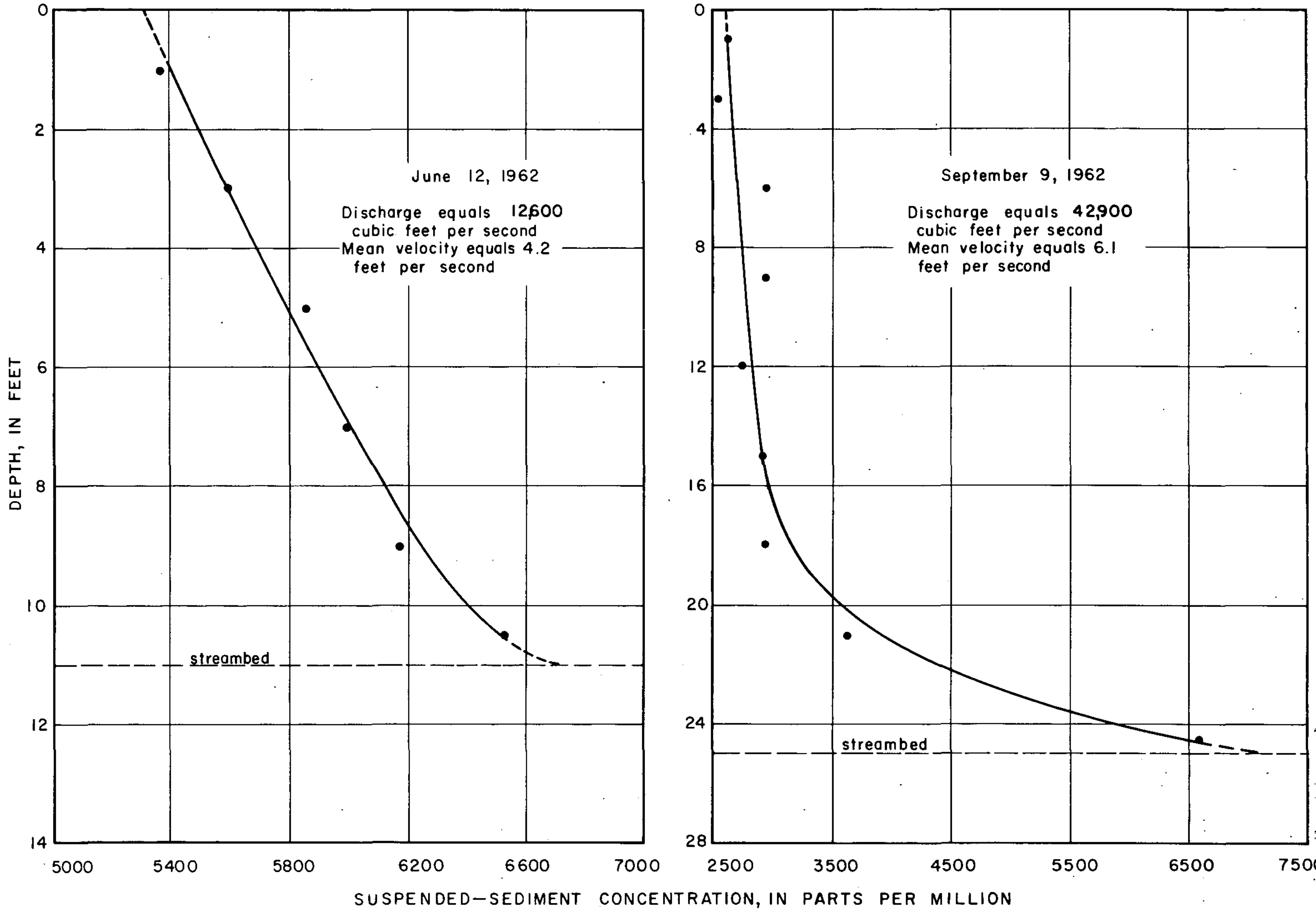

Figure 18

Vertical Distribution of Suspended - Sediment Concentration of the Brazos River near South Bend, Tex., June 12 and September 9, 1962

U.S. Geological Survey in cooperation with the Texas Water Development Board

Leon River at Gatesville, Tex.

The streamflow station on the Leon River at Gatesville (8-1005) is at the bridge on U.S. Highway 84 in Gatesville. Collection of streamflow data at this station, which began in 1950, is continuing. The Texas Water Development Board has collected sediment data here since 1953; during the 1962 water year, the U.S. Geological Survey collected sediment data at the station for comparing the depth-integrating samplers and the Texas sampler. A total of nine sets of samples were collected for comparison (Table 2). The ratios of sediment concentrations collected by the depth-integrating samplers to that of the Texas sampler are plotted against water discharge (Figure 19). No relation of ratio and water discharge is indicated.

Four sets of sediment samples for comparison were analyzed for particle-size distribution (Table 3). The averages of the analyses of the depth-intetrated samples showed that the suspended load consisted of 70 percent clay, 27 percent silt, and 3 percent sand. The comparison of the average size distributions of suspended sediment collected by the depth-integrating samplers and by the Texas sampler indicated that the latter collected only slightly less sand than the former (Figure 20).

Because most of the material in suspension is silt and clay, the suspended-sediment concentration was equally distributed throughout the vertical. Figure 21 shows the vertical distribution of suspended-sediment concentration for a discharge of 6,890 cfs on September 11, 1962. The overall increase in sediment concentration from top to bottom was less than 10 percent. This percentage change in concentration and the small quantity of sand in the suspended load indicates that the variation between the samples collected by the two samplers should not be very high. With two exceptions the ratios range from 1.04 to 1.17 and average 1.10 (Table 2). Additional data should be collected at this site to determine the range and average more closely.

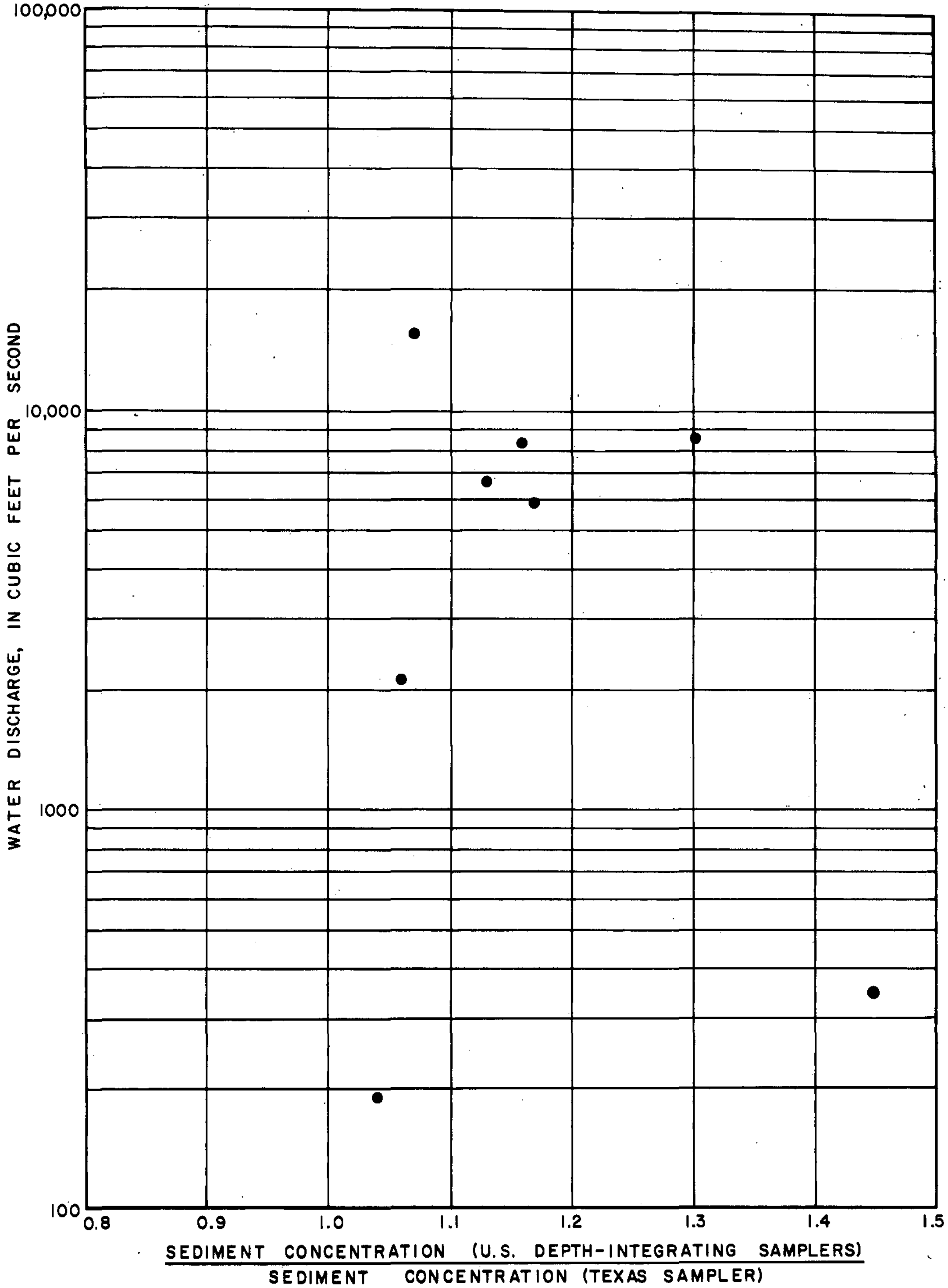

Figure 19

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Leon River at Gatesville, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

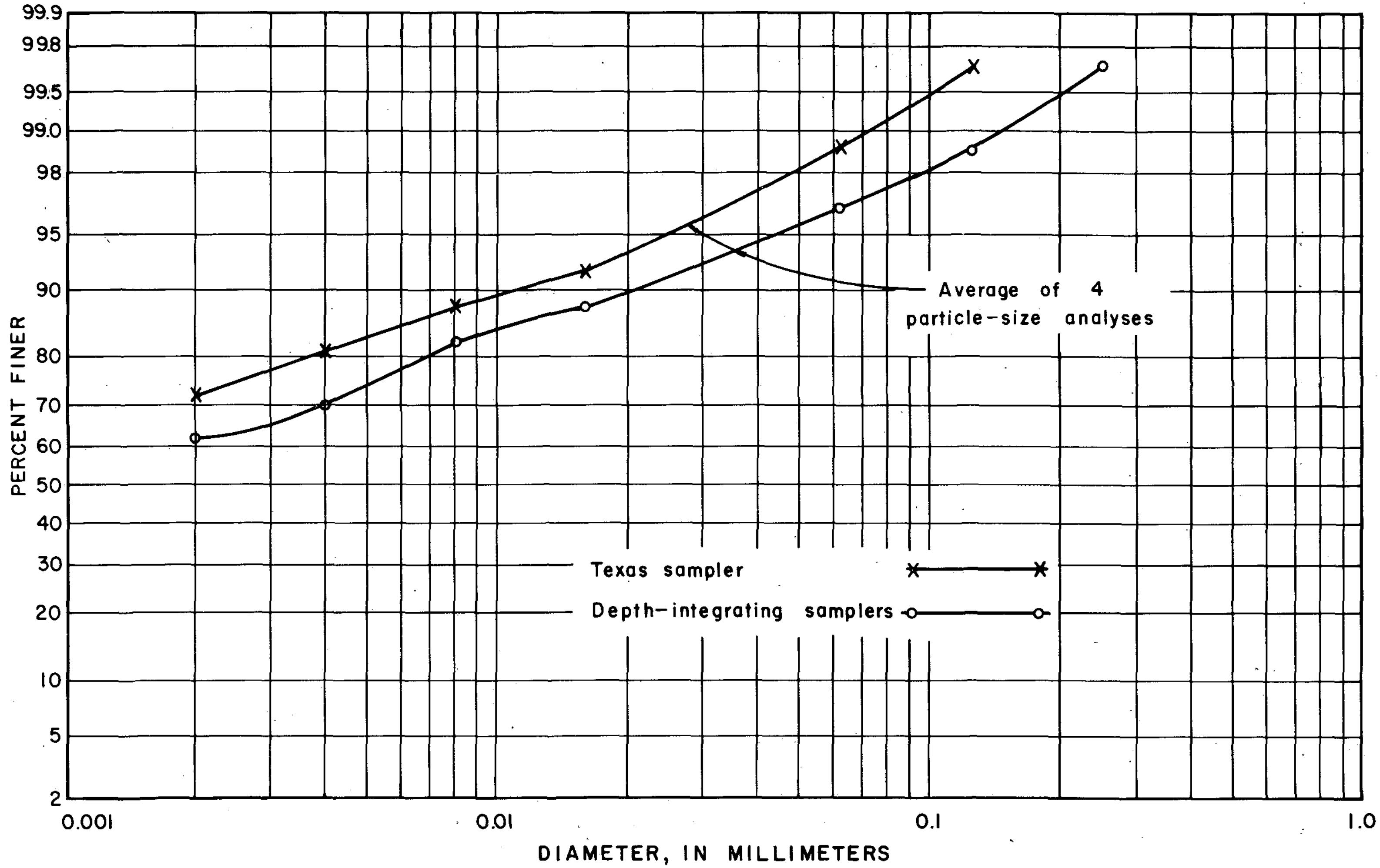

Figure 20

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Leon River at Gatesville, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

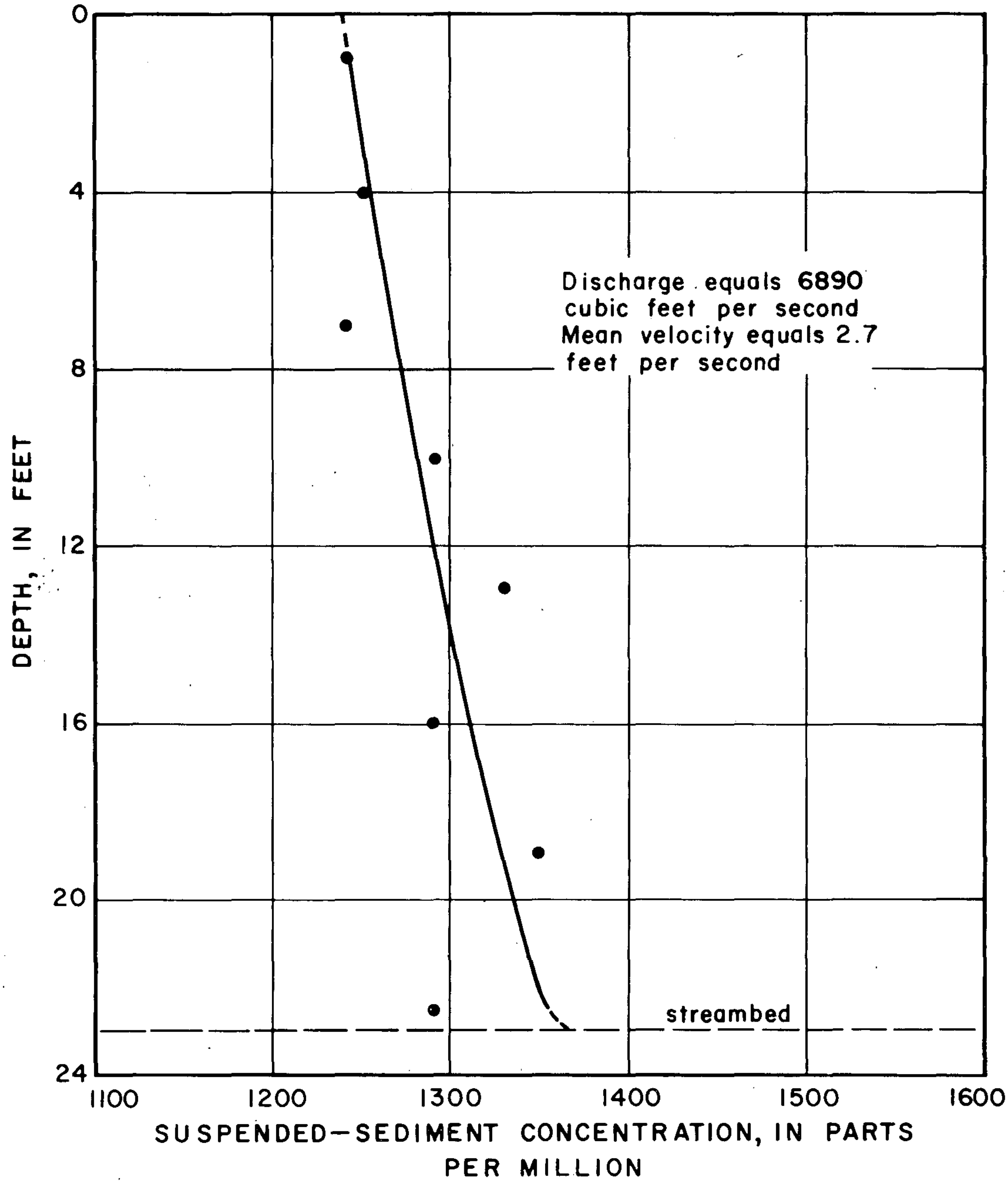

Figure 21

Vertical Distribution of Suspended - Sediment Concentration of the Leon River at Gatesville, Tex., September 11, 1962

U.S. Geological Survey in cooperation with the Texas Water Development Board

Brazos River at Richmond, Tex.

The streamflow station on the Brazos River at Richmond (8-1140) is at the bridge on U.S. Highway 59. Streamflow records are available from 1903 to 1906 and from 1922 to the present. Sediment data have been collected by the Texas Water Development Board since 1924.

During 1961 and 1962 the U.S. Geological Survey collected nine sets of sediment samples for comparison (Table 2) at discharges ranging from 880 to 39,900 cfs. The ratios of the 2 types of samplers ranged from 0.98 to 1.50. These ratios show no relation to water discharge (Figure 22). No single coefficient can be applied to the samples collected at this station with the Texas sampler because much of the sediment load is sand.

Six sets of samples were analyzed for size distribution (Table 3). The average suspended-sediment load during flood runoff was 52 percent clay, 30 percent silt, and 18 percent sand. The samples collected with the Texas sampler contained 7 percent less sand than the samples collected by depth integration (Figure 23).

Point samples were collected with the U.S. P-46 sediment sampler to define the vertical distribution of the suspended-sediment concentration on September 17, 1962 (Figure 24). The water discharge at this time was 20,300 cfs. Figure 24 shows that the suspended-sediment concentration in the vertical increased about 96 percent from near the surface to near the streambed.

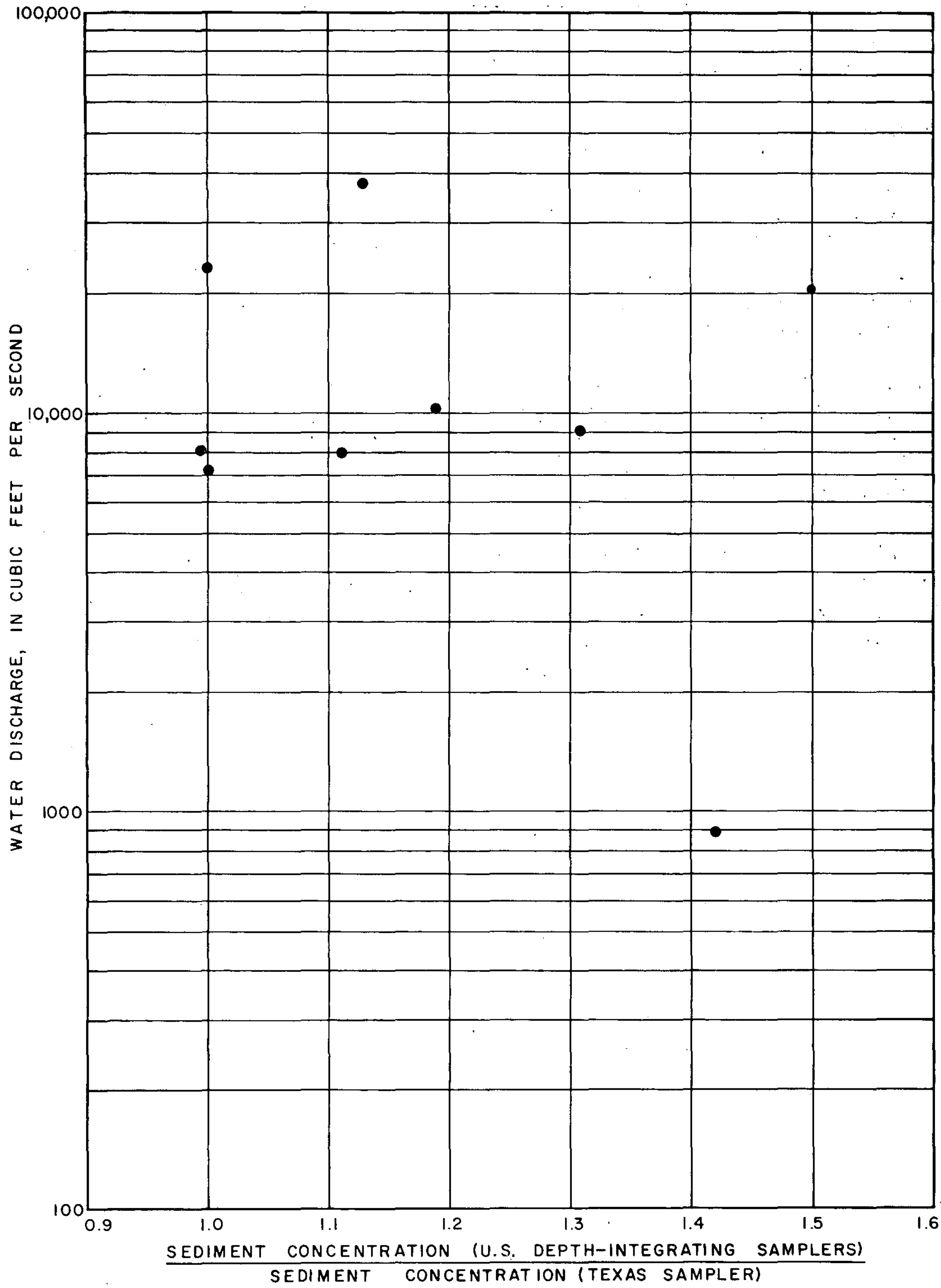

Figure 22

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Brazos River at Richmond, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

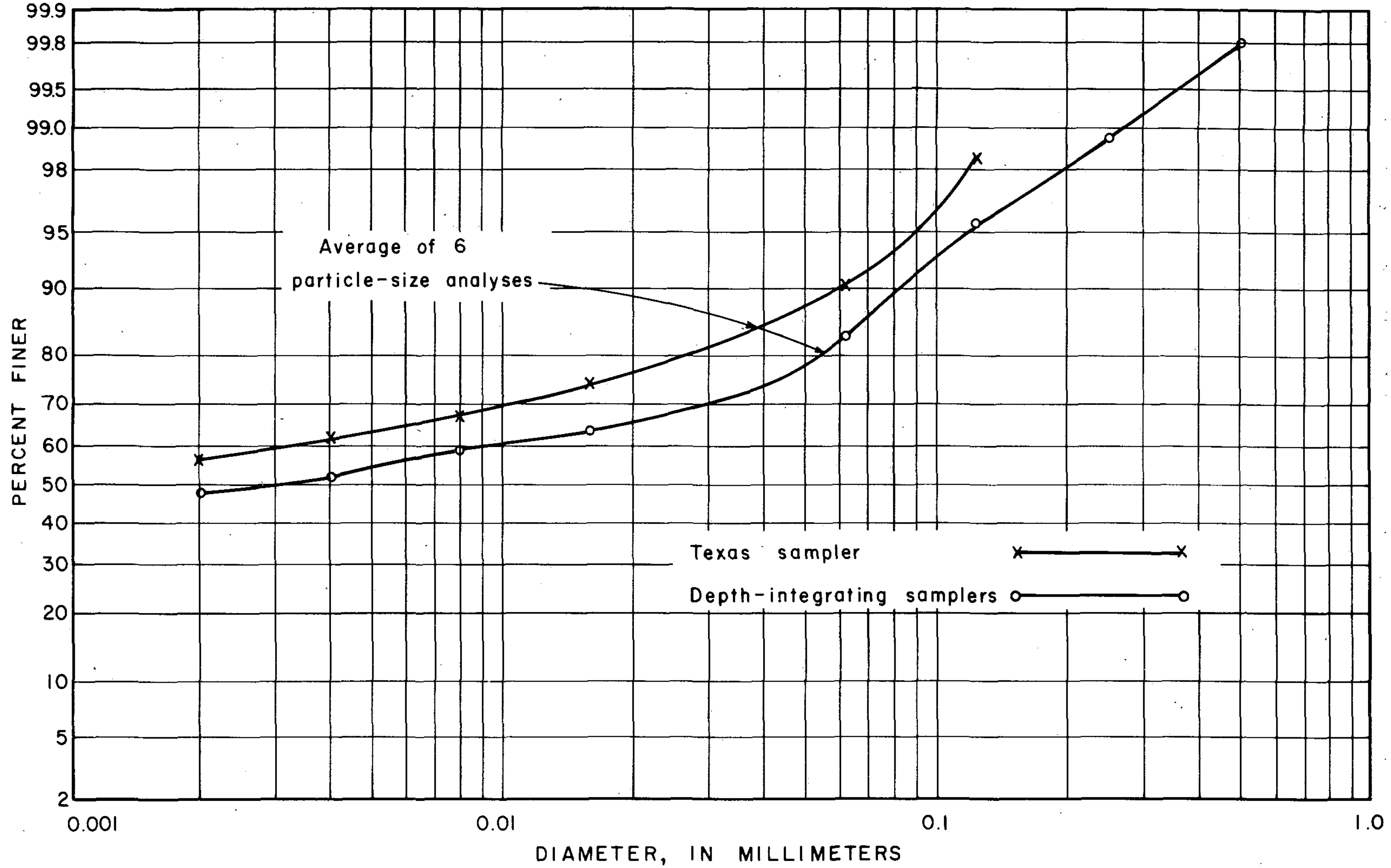

Figure 23

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Brazos River at Richmond, Tex.

U.S. Geological Survey in cooperation with the Texas Water Development Board

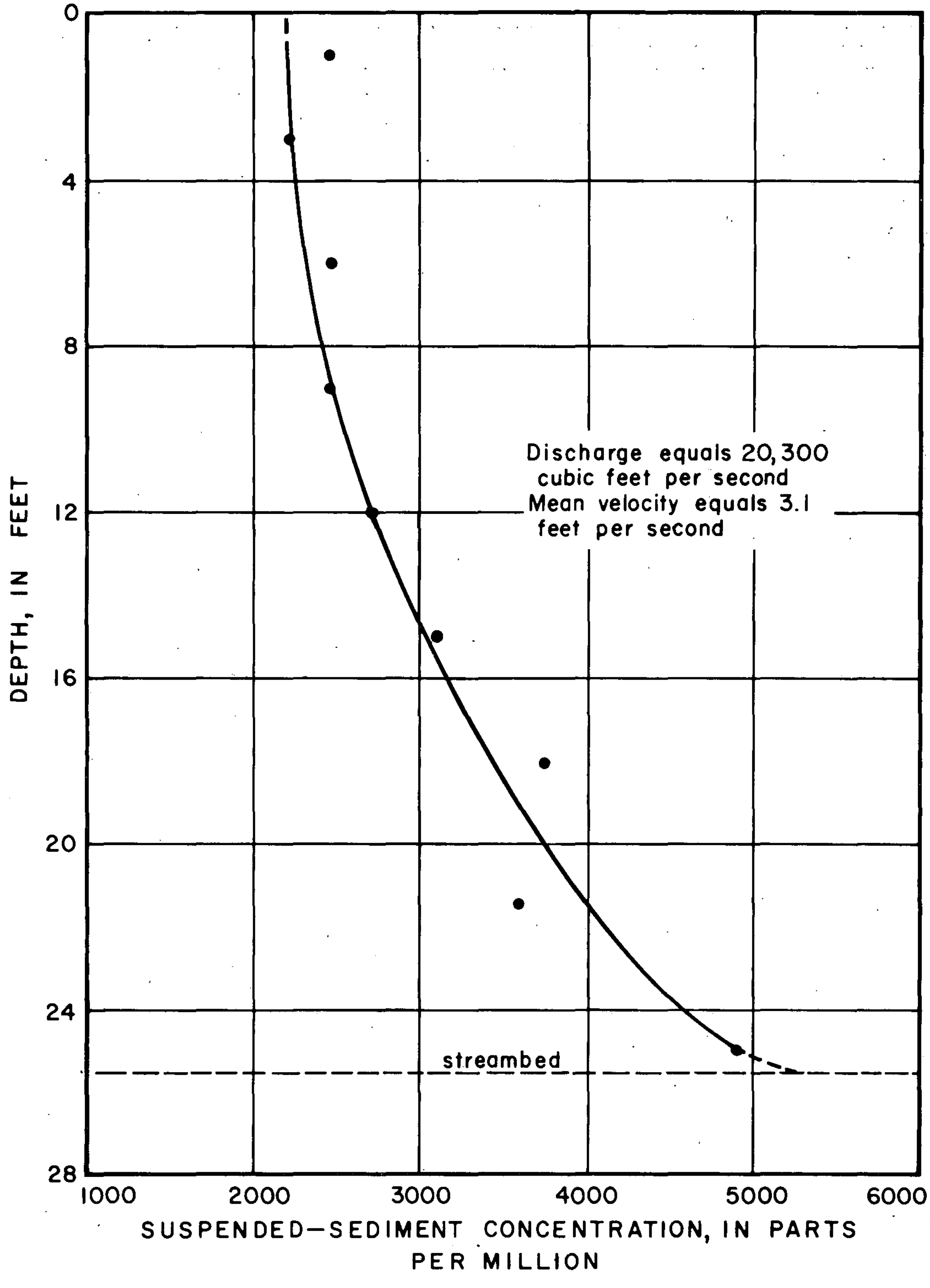

Figure 24

Vertical Distribution of Suspended-Sediment Concentration of the Brazos River at Richmond, Tex., September 17, 1962

U.S. Geological Survey in cooperation with the Texas Water Development Board

Colorado River at Robert Lee, Tex.

The streamflow station on the Colorado River at Robert Lee (8-1240) was at the bridge on State Highway 108. Streamflow data were collected at intervals of 4 to 16 years between 1915 and 1956. The U.S. Geological Survey operated a daily suspended-sediment station here from 1949 to 1951; during 1949 five sets of suspended-sediment samples were collected for comparison of the depth-integrating samplers with the Texas sampler (Table 2). Figure 25 indicates that no relation exists for the ratios (0.98 to 1.25) of sediment concentration of the samplers and water discharge. Data are not available for comparing the particle-size distribution of samples collected with the two types of samplers.

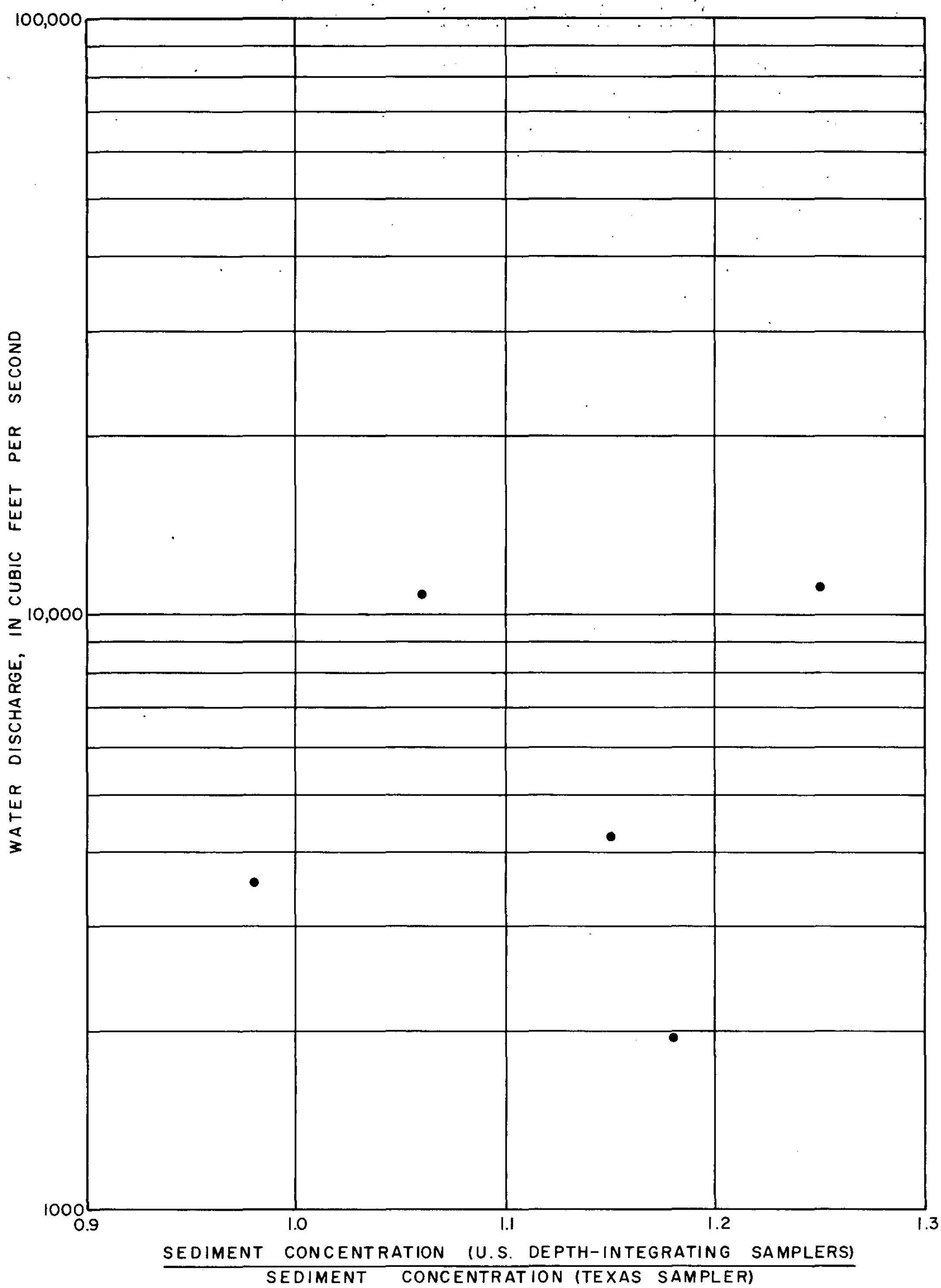

Figure 25

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Colorado River at Robert Lee, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

Colorado River near San Saba, Tex.

The streamflow station on the Colorado River near San Saba (8-1470) is at the bridge on U.S. Highway 190 and is 9.2 miles east of San Saba. Streamflow data have been collected here since 1930. Also since 1930 the Texas Water Development Board has been collecting sediment data at this site. Late in 1950 the U.S. Geological Survey established a daily suspended-sediment station here; this station was discontinued by the Survey in September 1962.

During the 1951 and 1952 water years the U.S. Geological Survey intensively compared the depth-integrating samplers with the Texas sampler. Approximately 60 comparison sets of sediment samples were collected (Table 2). The sediment concentrations of those samples collected by the Texas sampler were plotted against the sediment concentrations of those collected by the depth-integrating samplers (Figure 26); the 45° line represents a line of equal sediment concentration. As indicated by Figure 26, all the points are on or close to this line, showing that the concentrations collected by the two types of samplers are in good agreement.

A number of sets of sediment samples for comparison was analyzed for particle-size distribution and some of these are listed in Table 3. The particle-size distribution shows essentially no sand in suspension at this station. An arithmetic average of the particle-size distribution was computed and is plotted on Figure 27. The figure indicates that the two types of samplers collect sediment samples that have approximately the same particle-size distribution.

The Texas sampler can be used at this station to collect a representative sediment sample. The coefficient should be 1.00.

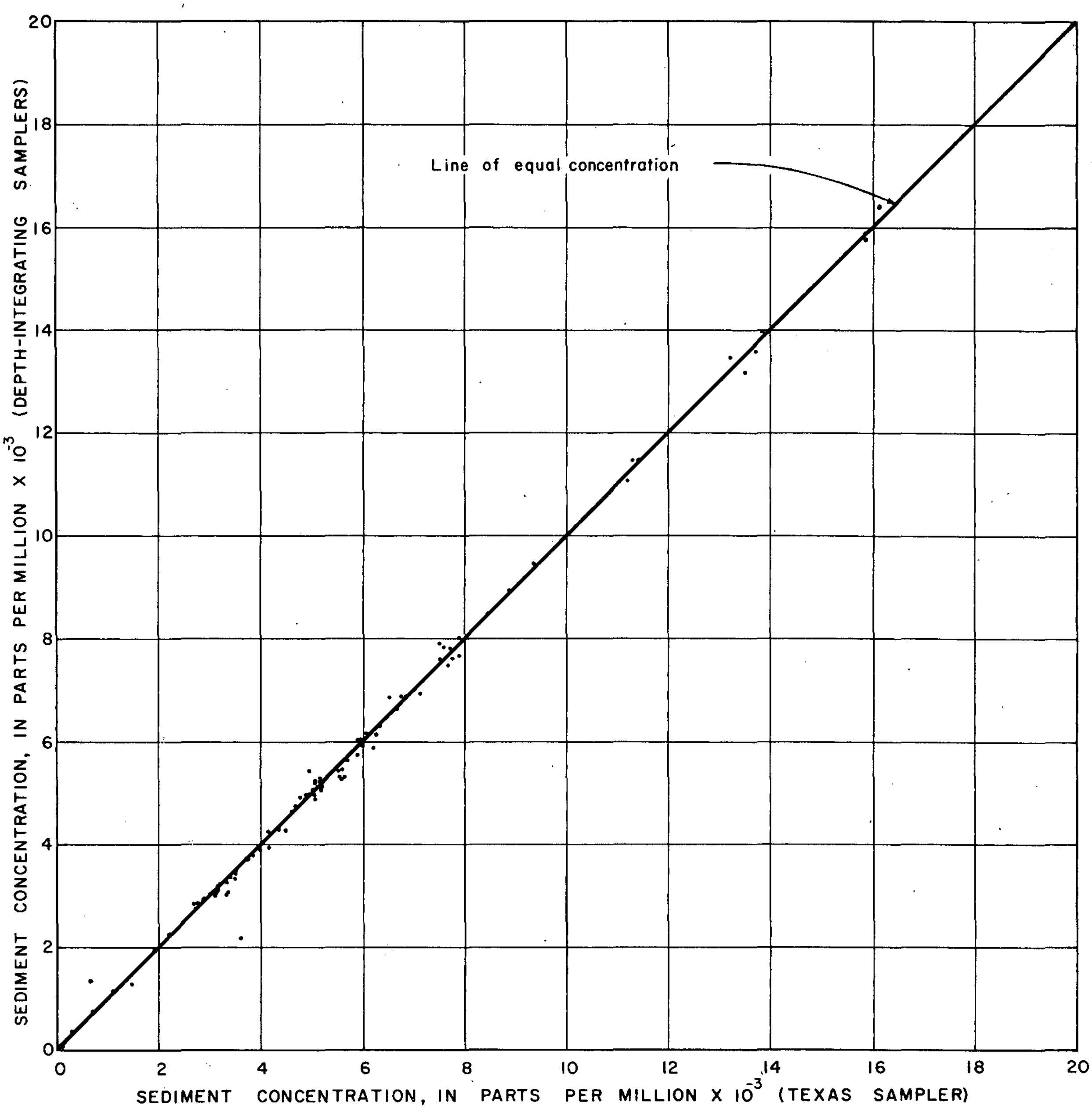

Figure 26

Comparison of Sediment Concentration from the Texas Sampler and from the Depth-Integrating Samplers, Colorado River near San Saba, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

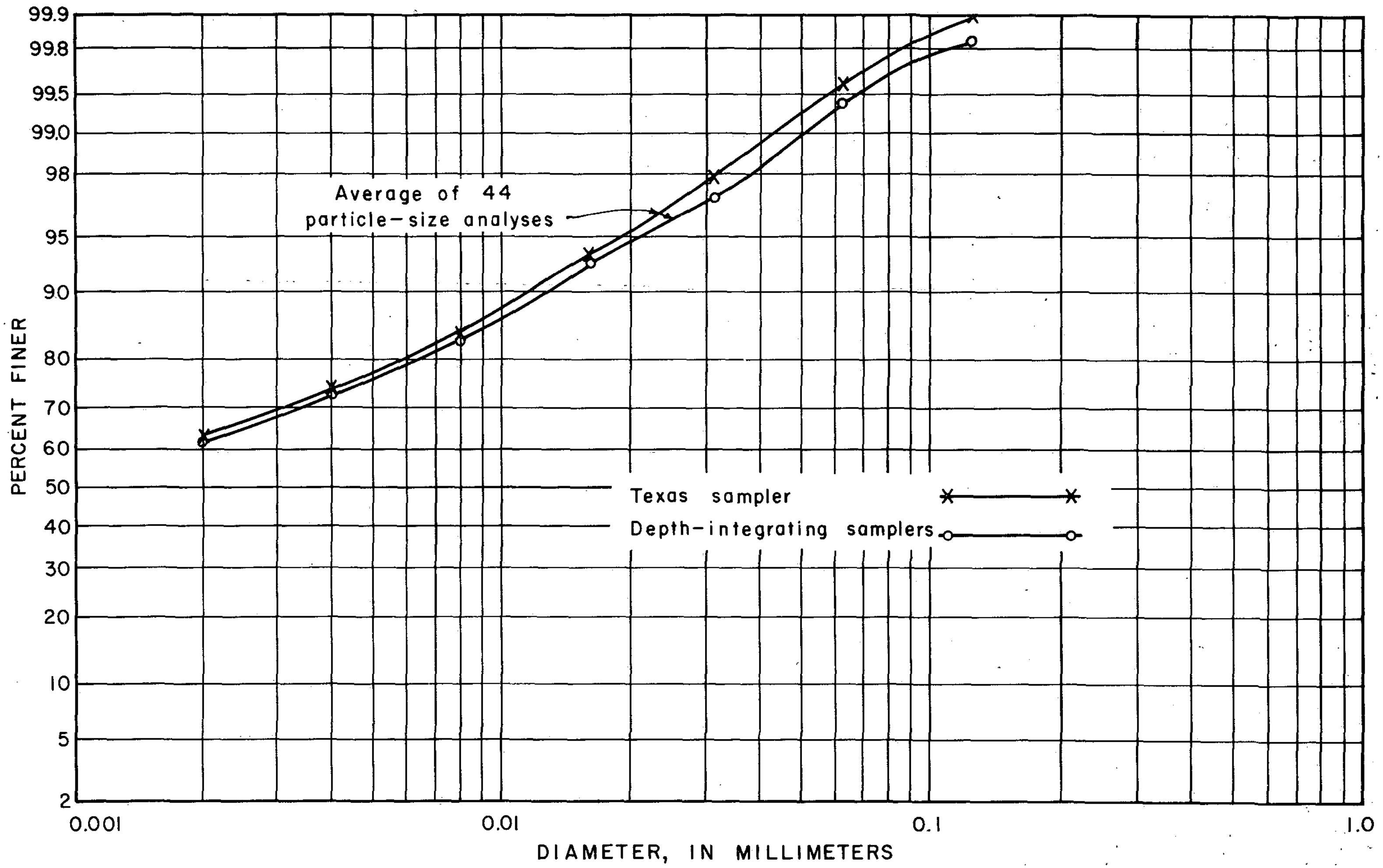

Figure 27

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, Colorado River near San Saba, Tex.

U.S. Geological Survey in cooperation with the Texas Water Development Board

Colorado River at Columbus, Tex.

The streamflow station on the Colorado River at Columbus (8-1610) is at the bridge on U.S. Highway 90 at the eastern edge of Columbus. Streamflow records are available from 1903 to 1911 and from 1916 to present. Sediment samples have been collected here by the U.S. Geological Survey since March 1957.

Seven sets of sediment samples for comparison were collected at this station (Table 2). In 5 of the 7 sets of samples collected, the Texas sampler collected more material than did the depth-integrating samplers. Figure 28 indicates that no relation exists for the ratios (0.85 to 1.31) of sediment concentration for the two types of samplers and water discharge.

None of the sediment samples collected by the Texas sampler were analyzed for particle-size distribution; however, particle-size analyses of samples collected by depth integration since March 1957 are listed in Table 3. Apparently the Texas sampler does not collect a representative sample at this station.

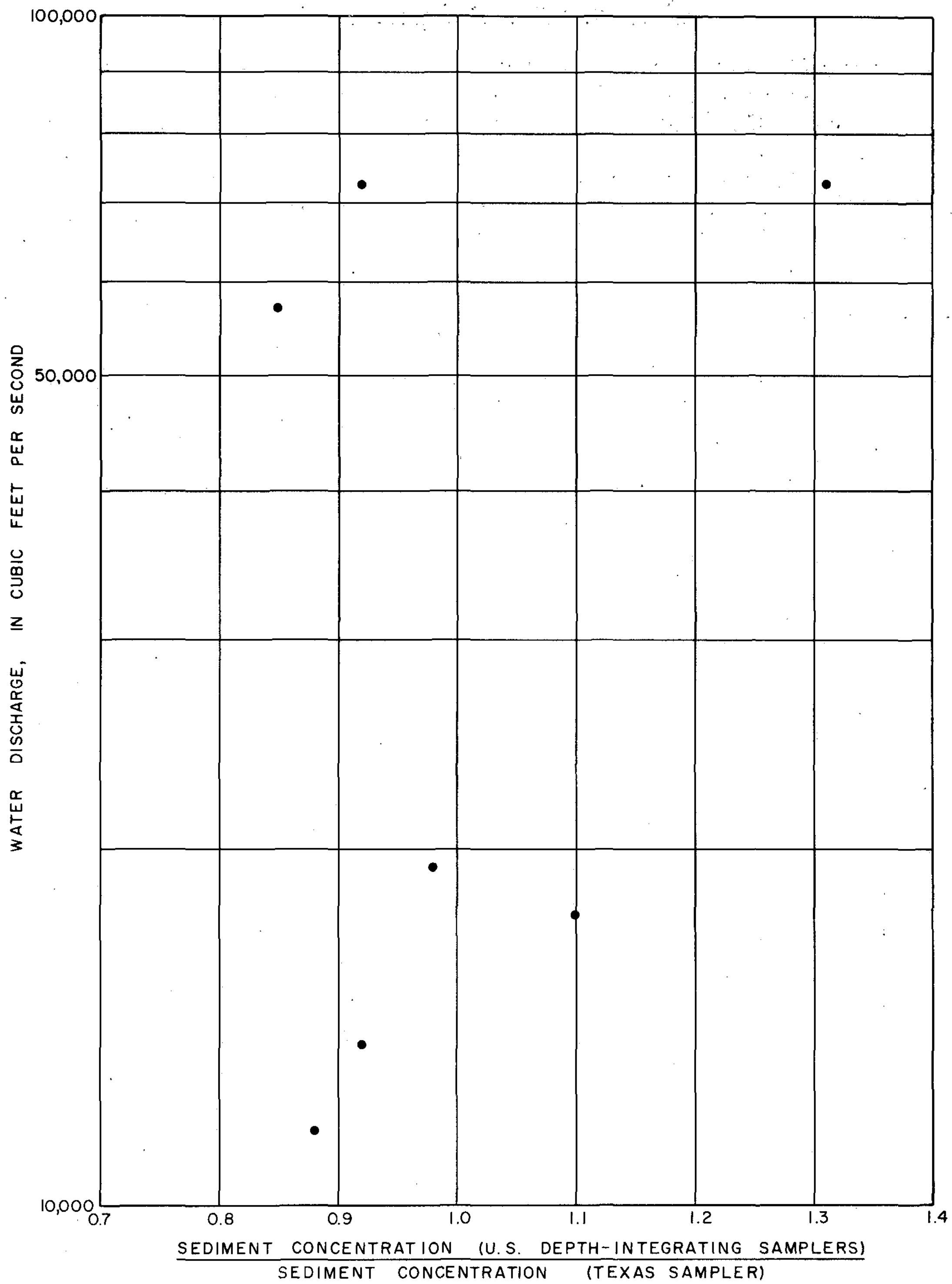

Figure 28

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Colorado River at Columbus, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

Lavaca River near Edna, Tex.

The streamflow station on the Lavaca River is at the bridge on U.S. Highway 59, 2.8 miles southwest of Edna (8-1640). Streamflow data have been available here since 1938. Sediment data collected by the Texas Water Development Board have been available here since 1945. Five sets of suspended-sediment samples were collected for comparison of the two types of samplers during the 1961 and 1962 water years (Table 2). Figure 29 indicates that the large variation of the ratios of suspended-sediment concentration has no relation to stream discharge.

Four sets of the sediment samples were analyzed for particle-size distribution. The particle-size analyses indicate that very little difference exists in size distribution of the suspended sediment collected by the two types of samplers (Table 3). Although more data should be collected at this station for comparison of the two samplers, the available data indicate that the Texas sampler does not collect a representative sample at this station even though the proportion of sand is small. This may indicate rapid fluctuations of sediment concentration in a short period of time.

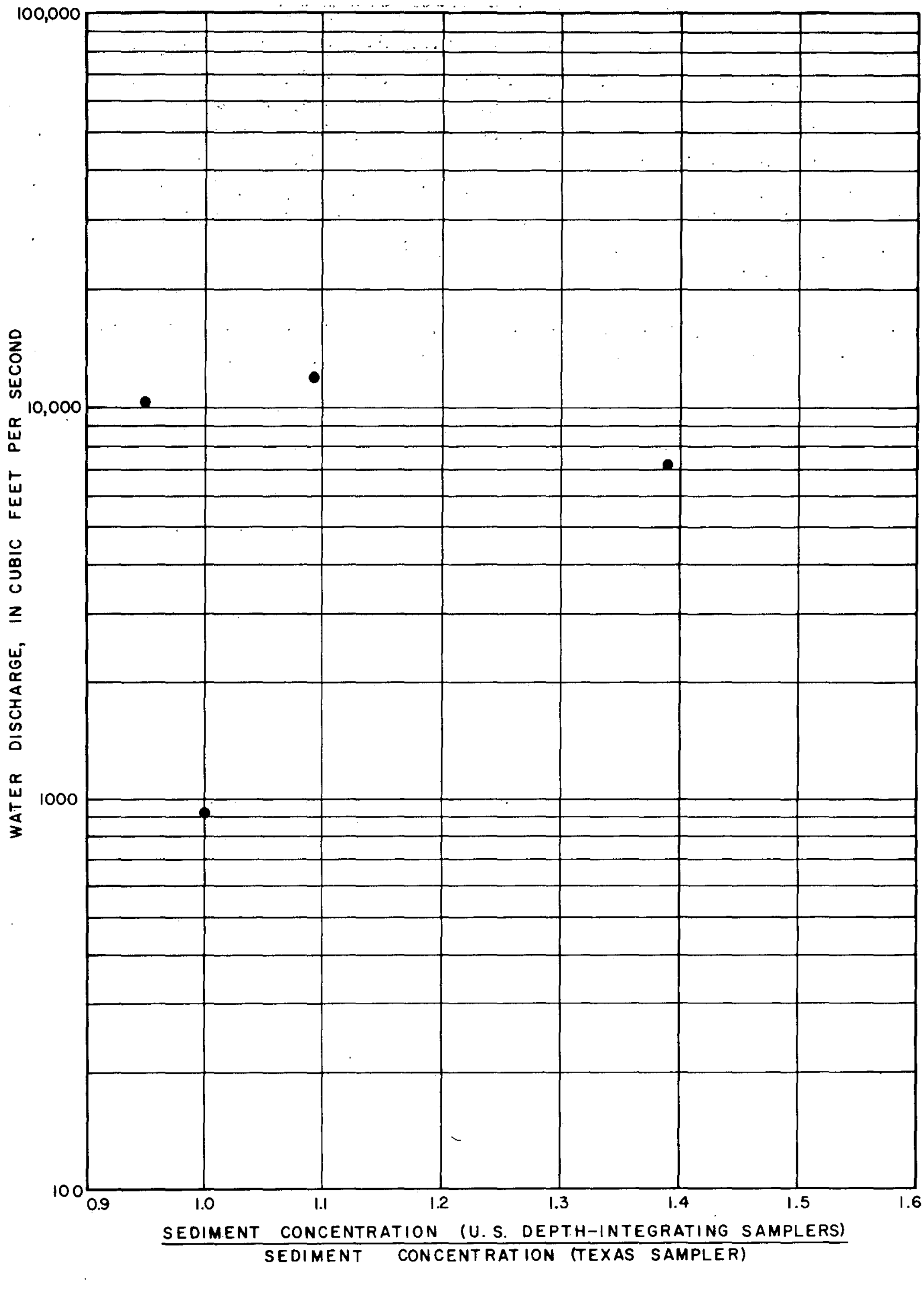

Figure 29

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Lavaca River near Edna, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

Guadalupe River at Victoria, Tex.

The streamflow station on the Guadalupe River at Victoria (8-1765) is at the bridge on U.S. Highway 59. Streamflow records have been collected here since 1934. The Texas Water Development Board has operated a sediment station here since 1945. Three sets of sediment samples for comparison were collected (Table 2). Although data were insufficient to evaluate adequately the Texas sampler, the ratios of sediment concentration plotted in Figure 30 probably have little relation to stream discharge. The ratios indicate that the Texas sampler probably will give results within 10 percent of accuracy if a coefficient of 1.1 is applied.

Data were not available to compare the particle-size distribution of samples collected by the depth-integrating samplers and by the Texas sampler.

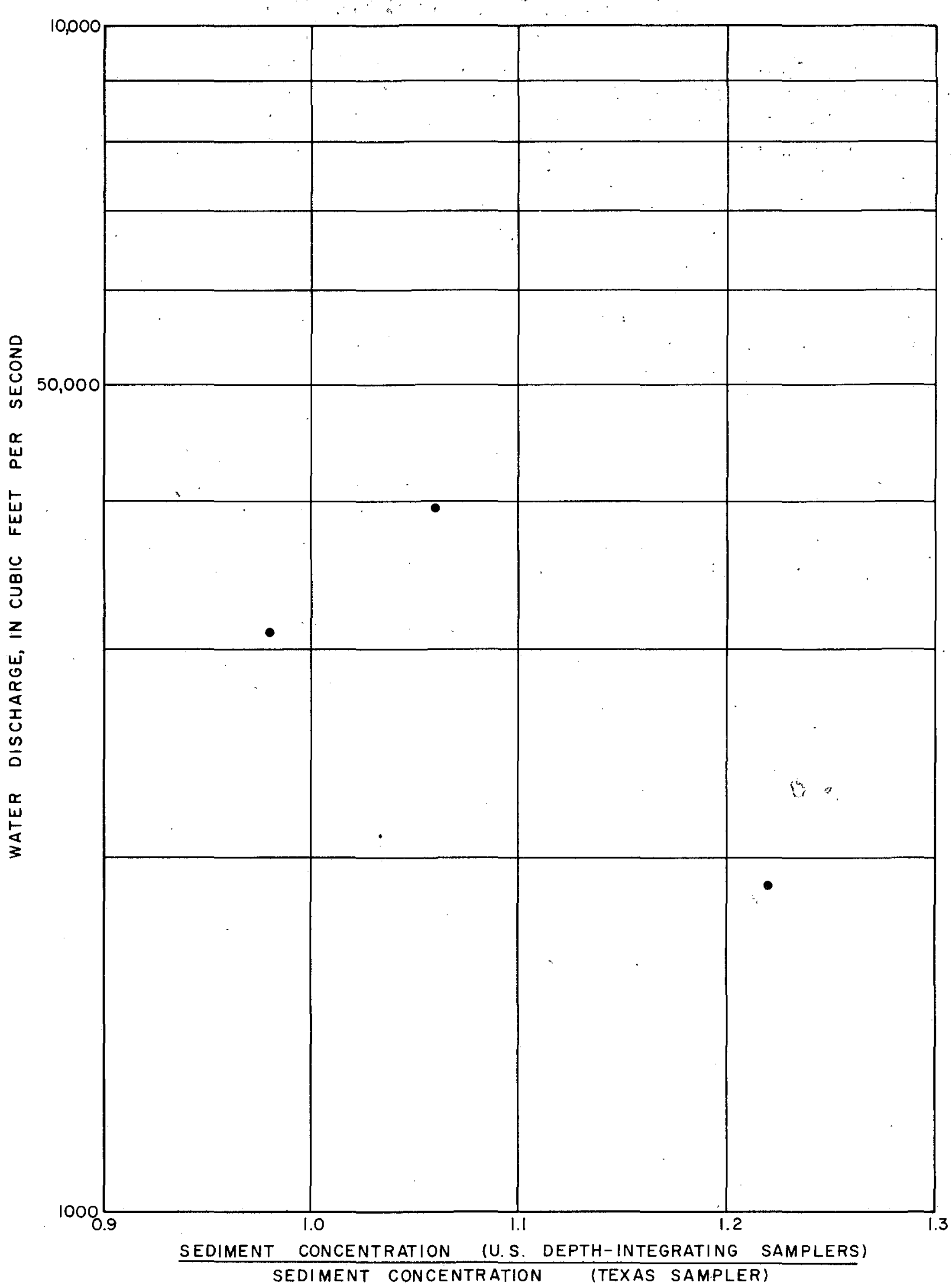

Figure 30

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, Guadalupe River at Victoria, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

San Antonio River at Goliad, Tex.

The streamflow station on the San Antonio River at Goliad (8-1885) is at the bridge on U.S. Highway 183, 1.3 miles southeast of the Goliad courthouse. Streamflow data are available for water years 1924-29 and from 1939 to the present. Sediment data have been collected by the Texas Water Development Board since 1942. The U.S. Geological Survey made total sediment discharge measurements in 1958-59, and in 1961-62 the Survey collected nine sets of suspended-sediment samples for comparison of the depth-integrating samplers and the Texas sampler (Table 2).

The ratios of the sediment concentrations of samples collected with the depth-integrating samplers to those of the Texas sampler were plotted against water discharge (Figure 31). The ratios have little relation to stream discharge.

Three sets of sediment samples for comparison were analyzed for particle-size distribution (Table 3). Because the suspended-sediment load carried by the San Antonio River contains only very small quantities of sand, the sediment could be expected to be almost uniformly distributed from the water surface to the bed; apparently the sediment concentration does not fluctuate rapidly with time. Thus the sediment concentrations of samples collected by the two types of samplers could be expected to be similar. A sample collected near the surface with the Texas sampler is representative probably within 5 percent. The particle-size distribution of sediment samples collected by the two samplers are similar but not the same (Figure 32).

A coefficient of 1.04 applied to the sediment concentrations collected by the Texas sampler for all rates of water discharge should give about 5 percent accuracy.

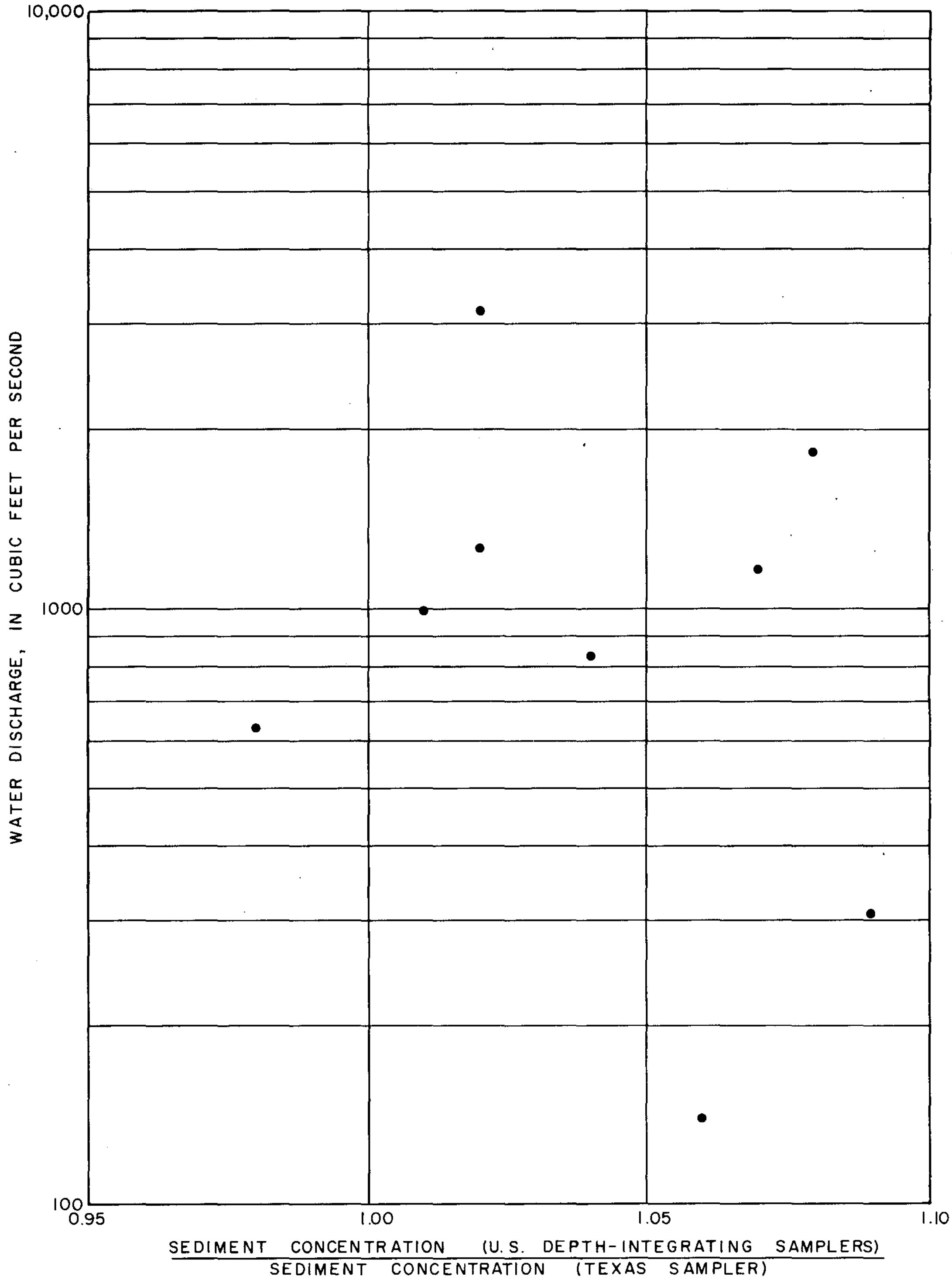

Figure 31

Ratio of Sediment Concentration from Depth-Integrated Samples to Sediment Concentration from Surface Samples Plotted Against Water Discharge, San Antonio River at Goliad, Tex.

U. S. Geological Survey in cooperation with the Texas Water Development Board

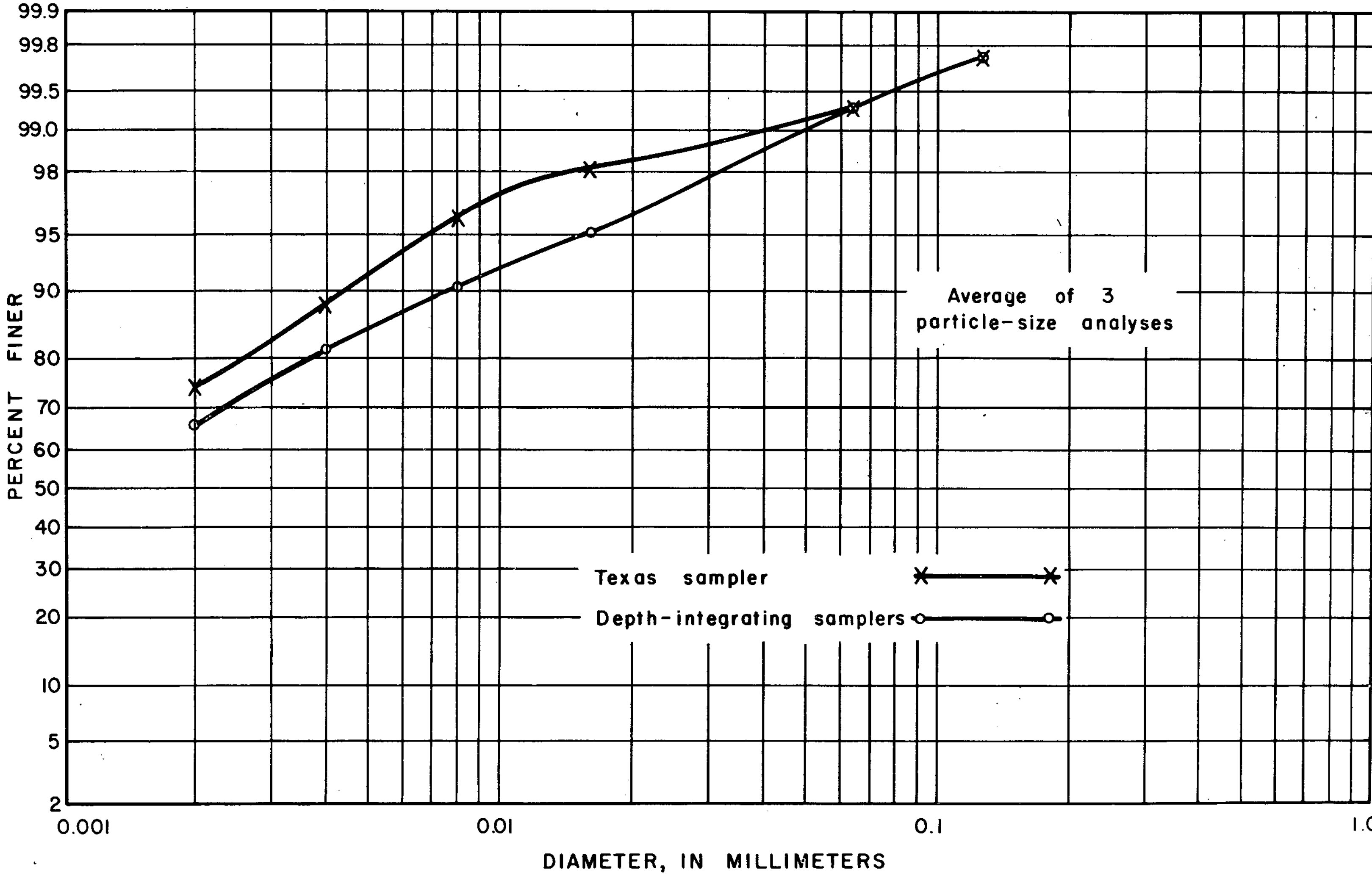

Figure 32

Particle-Size Distribution of Suspended-Sediment Samples Collected by the Texas Sampler and by the Depth-Integrating Samplers, San Antonio River at Goliad, Tex.

U.S. Geological Survey in cooperation with the Texas Water Development Board

APPENDIX B

BASIC DATA

Table 2.--Comparison of suspended-sediment concentrations collected with depth-integrating samplers to concentrations collected near the surface with the Texas sampler

Station	Date	Time (24-hour)	Water discharge (cfs)	Suspended-sediment concentration (ppm) Depth-integrating sampler	Suspended-sediment concentration (ppm) Texas sampler	Ratio[1/]
Sabine River at Logansport, La.	Apr. 7, 1961	0930	9,860	80	36	2.22
	May 10	1530	1,300	47	49	.96
	Apr. 17, 1962	0840	2,000	67	50	1.34
	May 4	1045	10,600	150	44	3.41
	June 19	0810	705	46	33	1.39
Sabine River near Bon Wier, Tex.	Jan. 12, 1961	1500	35,200	807	457	1.77
	Apr. 6	1400	23,300	205	164	1.25
	Sept. 15	0945	29,700	656	504	1.30
	May 4, 1962	1600	22,400	511	216	2.37
Neches River near Rockland, Tex.	Sept. 15, 1961	1310	5,340	143	129	1.11
	May 3, 1962	1615	12,200	138	107	1.29
	June 18	1500	1,200	65	52	1.05
	Nov. 30	1045	708	180	75	2.40
Neches River at Evadale, Tex.	Apr. 6, 1961	0915	16,600	38	33	1.15
	May 10	0915	4,120	161	110	1.46
West Fork Trinity River near Jacksboro, Tex.	Apr. 25, 1962	1505	818	886	848	1.04
	June 13	1445	1,740	234	236	.99
Trinity River at Romayor, Tex.	Apr. 5, 1961	1000	16,600	780	579	1.35
	Sept. 14	1345	30,800	631	509	1.24
	Jan. 30, 1962	1130	15,900	832	596	1.40
	do	1630	15,200	776	533	1.46
	May 3	1145	26,200	1,240	813	1.53
	May 5	1000	19,300	690	600	1.15
	Sept. 18	1345	10,200	629	512	1.23
	do	1815	10,200	1,230	397	3.10
	Sept. 19	0900	10,300	672	433	1.55
	do	1530	10,400	588	424	1.39
	Sept. 20	0915	10,400	468	377	1.24
	do	1240	10,400	587	462	1.27
	Nov. 30	0845	3,600	421	399	1.06

[1/] Ratio of suspended-sediment concentration collected with depth-integrating samplers to concentration collected near the surface with the Texas sampler.

Table 2.--Comparison of suspended-sediment concentrations collected with depth-integrating samplers to concentrations collected near the surface with the Texas sampler --Continued

Station	Date	Time (24-hour)	Water discharge (cfs)	Suspended-sediment concentration (ppm)		Ratio[1/]
				Depth-integrating sampler	Texas sampler	
West Fork San Jacinto River near Conroe, Tex.	Sept. 14, 1961	1100	9,900	238	148	1.61
	Sept. 21	1430	198	36	36	1.00
	Jan. 29, 1962	1650	2,920	491	335	1.47
	Jan. 31	0910	1,960	186	186	1.00
	Feb. 1	1315	970	140	110	1.27
	May 3	0945	730	108	75	1.44
	May 27	1330	35	40	29	1.38
	Nov. 29	1530	695	233	206	1.13
Spring Creek near Spring	Sept. 14, 1961	1030	9,180	38	35	1.09
Cypress Creek near Westfield	Sept. 14, 1961	1000	5,090	901	722	1.25
East Fork San Jacinto River near Cleveland, Tex.	Sept. 20, 1962	1145	19.7	79	45	1.76
	Nov. 29	1640	370	387	379	1.02
	May 24, 1963	1235	21.2	106	80	1.32
Double Mountain Fork Brazos River near Aspermont, Tex.	May 19, 1951	0845	1,150	35,100	35,200	1.00
	do	0847	1,150	34,900	34,600	1.01
	do	1023	1,000	32,300	32,900	.98
	do	1040	964	32,700	31,300	1.04
	June 13	1108	127	6,640	5,160	1.29
	June 15	1100	4,720	43,300	42,000	1.03
	do	1145	5,180	39,800	38,000	1.05
	do	1245	5,180	38,000	38,300	.99
	do	1400	4,600	36,500	33,100	1.10
	Aug. 22	0855	102	22,000	21,600	1.02
	do	0920	100	19,900	19,900	1.00

1/ Ratio of suspended-sediment concentration collected with depth-integrating samplers to concentration collected near the surface with the Texas sampler.

Table 2.--Comparison of suspended-sediment concentrations collected with depth-integrating samplers to concentrations collected near the surface with the Texas sampler --Continued

Station	Date	Time (24-hour)	Water discharge (cfs)	Suspended-sediment concentration (ppm)		Ratio[1/]
				Depth-integrating sampler	Texas sampler	
Brazos River near South Bend, Tex.	June 11, 1962	1930	20,200	5,110	4,300	1.19
	June 12	1100	12,600	6,030	5,720	1.06
	do	1530	10,800	6,120	5,980	1.02
	do	1900	9,800	6,040	5,800	1.04
	June 13	0900	9,800	3,640	2,900	1.26
	do	1215	10,200	3,520	3,300	1.07
	June 20	0900	1,240	8,670	7,320	1.18
	Sept. 9	1540	42,900	3,680	2,470	1.49
	Sept. 10	0915	27,600	3,140	2,920	1.08
North Bosque River at Hico, Tex.	June 20, 1962	1205	3.30	38	19	2.00
Leon River at Gatesville, Tex.	Oct. 10, 1961	1415	16,000	1,550	1,450	1.07
	June 14, 1962	1345	330	420	290	1.45
	June 20	1330	62.6	197	187	1.05
	Sept. 8	1645	2,240	3,170	2,990	1.06
	Sept. 9	0835	195	1,250	1,200	1.04
	Sept. 11	1330	5,980	2,010	1,720	1.17
	do	1745	6,890	1,440	1,280	1.13
	Sept. 12	0900	8,550	871	671	1.30
	do	1345	8,330	693	595	1.16
Navasota River near Easterly, Tex.	June 18, 1962	1000	73.2	145	112	1.29
Brazos River at Richmond, Tex.	Feb. 15, 1961	1530	23,700	1,610	1,610	1.00
	Apr. 4	1615	7,310	690	688	1.00
	Sept. 13	1715	39,900	5,650	5,000	1.13
	Nov. 14	1515	8,250	1,200	1,220	.98
	Jan. 31, 1962	1100	9,100	1,080	826	1.31
	July 27	0825	880	51	36	1.42
	Sept. 17	1530	20,300	3,340	2,230	1.50
	Sept. 21	0855	10,800	1,800	1,510	1.19
	Nov. 29	1330	8,080	2,200	1,980	1.11

1/ Ratio of suspended-sediment concentration collected with depth-integrating samplers to concentration collected near the surface with the Texas sampler.

Table 2.--Comparison of suspended-sediment concentrations collected with depth-integrating samplers to concentrations collected near the surface with the Texas sampler --Continued

Station	Date	Time (24-hour)	Water discharge (cfs)	Suspended-sediment concentration (ppm)		Ratio[1/]
				Depth-integrating sampler	Texas sampler	
Colorado River at Robert Lee, Tex.	Apr. 20, 1949	1350	3,590	11,300	11,500	0.98
	Apr. 21	1050	1,950	13,700	11,600	1.18
	May 8	1630	11,100	13,800	11,000	1.25
	do	1930	10,800	11,700	11,000	1.06
	May 9	0730	4,260	10,100	8,810	1.15
Colorado River near San Saba, Tex.	May 23, 1951	1222	11,400	7,700	7,680	1.00
	June 12	1215	4,910	3,750	3,780	.99
	do	1450	6,230	4,780	4,710	1.01
	Aug. 14	0815	235	1,340	1,420	.94
	do	0843	1,950	1,200	1,120	1.07
	do	0940	3,810	3,020	3,040	.99
	do	1053	5,040	6,630	6,670	.99
	do	1145	5,560	9,520	9,380	1.01
	do	1315	6,100	11,500	11,400	1.01
	do	1435	6,360	14,000	13,900	1.01
	do	1550	6,500	13,600	13,700	.99
	do	1700	6,500	13,200	13,500	.98
	do	1848	6,500	15,700	15,800	.99
	do	2145	5,820	15,800	15,800	1.00
	Aug. 15	0230	4,170	11,100	11,200	.99
	do	0705	2,900	8,970	8,880	1.01
	Aug. 23	1700	543	340	330	1.03
	Apr. 22, 1952	1325	6,100	6,880	6,820	1.01
	do	1450	6,100	6,100	6,000	1.02
	do	1730	5,690	5,920	5,940	1.00
	do	1700	5,820	6,180	6,210	1.00
	do	2140	4,910	6,980	7,140	.98
	do	2400	4,410	6,900	7,060	.98
	Apr. 23	0330	3,690	5,900	5,860	1.01
	do	0720	3,810	6,060	5,900	1.03

1/ Ratio of suspended-sediment concentration collected with depth-integrating samplers to concentration collected near the surface with the Texas sampler.

Table 2.--Comparison of suspended-sediment concentrations collected with depth-integrating samplers to concentrations collected near the surface with the Texas sampler --Continued

Station	Date	Time (24-hour)	Water discharge (cfs)	Suspended-sediment concentration (ppm)		Ratio[1/]
				Depth-integrating sampler	Texas sampler	
Colorado River near San Saba, Tex.--Continued	Apr. 23, 1952	0855	4,170	5,470	5,520	0.99
	do	1020	4,530	4,940	4,960	1.00
	do	1205	5,040	4,900	4,840	1.01
	do	1335	5,430	4,980	4,710	1.06
	do	1455	5,690	5,090	5,060	1.01
	do	1640	5,960	5,970	5,970	1.00
	do	1910	6,100	7,700	7,660	1.01
	do	2245	5,820	7,310	7,380	.99
	Apr. 24	0755	3,340	5,300	5,180	1.02
	do	1300	3,810	6,040	6,200	.97
	May 1	1600	820	359	343	1.05
	do	1740	1,280	773	766	1.01
	do	2100	5,690	8,580	8,100	1.06
	do	2310	7,890	16,400	16,400	1.00
	May 2	0435	11,300	11,500	11,400	1.01
	do	0715	12,300	8,520	8,520	1.00
	do	0940	12,900	6,960	6,830	1.02
	do	1155	13,400	6,350	6,340	1.00
	do	1340	13,600	5,780	5,900	.98
	do	1700	13,600	5,130	5,210	.98
	do	1800	13,600	5,000	4,980	1.00
	do	2010	12,800	5,090	5,180	.98
	do	2350	10,100	5,460	5,460	1.00
	May 3	0420	5,690	4,930	4,950	1.00
	do	0705	3,810	4,650	4,660	1.00
	do	1030	2,570	4,360	4,370	1.00
	do	1300	2,210	3,960	4,170	1.00
	do	1450	2,070	4,270	4,130	1.03
	do	1800	1,880	3,930	3,990	.98
	do	2315	1,660	3,800	3,820	.99

1/ Ratio of suspended-sediment concentration collected with depth-integrating samplers to concentration collected near the surface with the Texas sampler.

Table 2.--Comparison of suspended-sediment concentrations collected with depth-integrating samplers to concentrations collected near the surface with the Texas sampler --Continued

Station	Date	Time (24-hour)	Water discharge (cfs)	Suspended-sediment concentrations (ppm)		Ratio[1]
				Depth-integrating sampler	Texas sampler	
Colorado River near San Saba, Tex.--Continued	May 4, 1952	0845	1,210	3,320	3,290	1.01
	do	1230	1,100	3,020	3,220	.94
	May 19	1315	13,300	5,620	5,680	.99
	do	1500	14,200	5,270	5,380	.98
	do	2145	11,500	4,880	5,030	.97
	do	2400	9,900	4,250	4,300	.99
Colorado River at Columbus, Tex.	Feb. 18, 1961	0915	17,600	1,820	1,650	1.10
	do	1225	19,300	2,430	2,490	.98
	Sept. 12	1540	57,000	1,550	1,830	.85
	Sept. 13	1020	72,500	704	584	1.31
	do	1120	72,500	631	683	.92
	Sept. 15	1020	13,700	715	890	.92
	do	1230	11,600	809	921	.88
Lavaca River near Edna, Tex.	Sept. 13, 1961	1130	13,600	244	224	1.09
	Nov. 14	1730	7,260	335	241	1.39
	Nov. 15	1130	10,400	103	108	.95
	July 25, 1962	0815	30.7	59	24	2.46
	Sept. 19	0835	920	674	675	1.00
Navidad River at Halletsville, Tex.	May 23, 1962	1140	26.5	35	33	1.06
Guadalupe River at Victoria, Tex.	Sept. 12, 1961	1730	3,100	258	261	.99
	Nov. 14	2040	1,900	168	139	1.21
	Nov. 15	0825	3,950	211	195	1.08
San Antonio River at Goliad, Tex.	Sept. 12, 1961	1530	306	110	101	1.09
	Nov. 14	1850	1,820	2,150	1,990	1.08
	Nov. 15	0920	3,140	1,660	1,630	1.02
	July 24, 1962	1240	139	118	111	1.06
	Nov. 28	0900	830	1,300	1,250	1.04

[1] Ratio of suspended-sediment concentration collected with depth-integrating samplers to concentration collected near the surface with the Texas sampler.

Table 2.--Comparison of suspended-sediment concentrations collected with depth-integrating samplers to concentrations collected near the surface with the Texas sampler--Continued

Station	Date	Time (24-hour)	Water discharge (cfs)	Suspended-sediment concentration (ppm)		Ratio[1/]
				Depth-integrating sampler	Texas sampler	
San Antonio River at Goliad, Tex.--Continued	Nov. 28, 1962	1130	990	2,280	2,250	1.01
	do	1425	1,160	2,770	2,580	1.07
	do	2040	1,250	3,320	3,260	1.02
	Nov. 29	0915	630	3,840	3,980	.98
Nueces River near Three Rivers, Tex.	June 5, 1951	1255	12,780	847	849	1.00
	do	1615	12,660	740	704	1.05
	do	2305	12,300	595	566	1.05
	June 6	0330	12,180	568	525	1.08
	do	0950	11,400	508	481	1.06

1/ Ratio of suspended-sediment concentration collected with depth-integrating samplers to concentration collected near the surface with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment: Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	Methods of analysis
								7-2985. PRAIRIE DOG TOWN FORK RED RIVER NEAR BRICE, TEX.								
Oct. 10, 1949	1700		285	36,300	27,900	34	51	72	85	90	95	99	100	--		SBWCM
Oct. 13	0845		2.6	9,760	68	74	88	96	100	--	--	--	--	--		BWCM
May 14, 1950	0850		452	20,400	24,900	48	51	54	60	68	87	98	100	--		SBWCM
June 2	0937		325	29,100	25,500	66	69	82	88	93	95	99	100	--		SBWCM
June 21	0930		759	38,600	79,100	42	62	68	76	80	86	92	98	100		SBWCM
Do.	1310		444	23,600	28,300	56	80	89	97	98	99	100	--	--		SBWCM
June 22	0900		47	14,700	1,870	75	91	97	99	100	100	--	--	--		SBWCM
June 24	1015		2.9	1,690	13	91	98	100	--	--	--	--	--	--		SBWCM
June 27	0940		27	22,200	1,620	65	76	88	97	99	100	--	--	--		SBWCM
June 29	0810		4,020	47,400	514,000	21	28	36	47	62	80	91	100	--		SBWCM
June 30	1225		148	18,400	7,350	59	65	74	78	82	85	90	97	100		SBWCM
July 2	1050		27	2,910	212	59	80	88	93	94	96	98	100	--		SBWCM
July 4	1515		1,740	37,900	178,000	34	46	56	68	79	90	99	100	--		SBWCM
Do	1700		1,540	33,700	140,000	--	54	69	79	87	94	98	100	--		SBWCM
July 5	1315		9,100	54,200	1,330,000	25	34	40	51	66	81	93	97	100		SBWCM
July 6	1212		531	9,730	14,000	41	51	60	69	78	83	91	95	100		SBWCM
July 8	1800		128	4,340	1,500	39	54	62	67	71	77	90	98	100		SBWCM
July 27	1340		244	5,950	3,920	50	61	70	78	82	92	100	--	--		SBWCM
July 21	1245		1,780	28,200	136,000	38	48	60	71	82	90	98	100	--		SBWCM
Aug. 1	1430		947	15,200	38,900	27	38	44	53	65	78	93	99	100		SBWCM
Aug. 9	1732		244	19,500	12,800	--	46	58	73	83	85	95	99	100		SPWCM
Aug. 27	1900		618	28,700	47,900	--	58	69	80	85	88	96	100	--		SPWCM
Sept. 4	1100		148	8,160	3,260	40	51	63	70	74	80	95	100	--		SPWCM
Sept. 11	1515		1,080	24,200	70,600	42	50	62	74	82	87	94	100	--		SBWCM
Sept. 26	1140		1,370	23,000	85,100	41	47	56	66	79	88	97	100	--		SBWCM
Oct. 3	1330		57	18,600	2,860	73	88	97	100	--	--	--	--	--		SPWCM
May 16, 1951	1550		6,340	43,300	741,000	--	34	42	50	62	68	82	99	100		SPWCM
May 18	1520		4,620	22,800	284,000	29	33	42	54	67	79	92	97	100		SPWCM
May 26	1150		222	4,240	2,540	46	64	72	80	85	90	99	100	--		SBWCM
June 3	1145		174	3,760	1,770	44	56	63	70	76	80	92	99	100		SBWCM
June 13	1640		340	6,500	5,970	--	53	63	73	76	83	96	100	--		SPWCM
June 15	1645		450	9,020	11,000	--	47	58	71	80	86	98	100	--		SPWCM
June 22	0730		313	14,300	12,100	--	67	79	86	89	92	97	99	100		SPWCM
Do.	1100		236	9,560	6,090	--	61	75	83	87	91	98	100	--		SPWCM
June 25	1245		486	30,700	40,300	--	57	70	83	89	97	100	--	--		SPWCM
July 2	1100		730	22,400	44,200	--	46	60	75	86	90	97	100	--		SPWCM

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment													Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters											
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000		
7-2990. MULBERRY CREEK NEAR BRICE, TEX.																	
June 2, 1950	1550		109	26,900	7,920	38	53	63	68	71	74	83	83	96			SBWCM
July 4	0900		535	28,100	40,600	41	50	61	74	82	88	95	99	100			SBWCM
Do.	1842		90	11,200	2,720	31	40	52	57	60	91	95	98	100			SPWCM
July 5	1951		87	5,030	1,180	38	57	65	71	76	81	89	99	100			SBWCM
July 16	1845		23,800	39,200	2,520,000	33	47	60	76	94	100	--	--	--			SBWCM
July 17	0809		185	4,760	2,380	38	46	55	64	69	78	96	100	--			SBWCM
July 22	1010		133	17,500	6,280	36	46	58	68	79	90	98	100	--			SBWCM
July 24	1530		213	6,000	3,450	19	28	37	50	60	83	96	99	100			SBWCM
Aug. 9	1620		109	3,460	1,020	48	57	69	75	80	86	93	99	100			SBWCM
Aug. 28	1050		34	8,280	760	50	70	88	92	94	99	99	100	--			SPWCM
Sept. 4	1350		29	26,500	2,070	--	31	44	58	72	84	98	100	--			SPWCM
Sept. 11	1640		225	10,200	6,200	36	43	52	61	67	74	85	95	100			SBWCM
Sept. 26	0920		535	10,200	14,700	35	41	53	62	64	82	93	100	--			SBWCM
May 17, 1951	1000		1,260	12,700	43,200	--	37	51	59	67	85	94	99	100			SPWCM
May 19	1600		109	3,180	936	46	57	63	70	78	83	91	95	100			SBWCM
June 2	1400		414	11,500	12,900	35	45	53	59	66	74	88	100	--			SPWCM
June 6	1935		84	2,890	655	35	47	53	60	66	74	88	98	100			SBWCM
June 15	1445		269	5,620	4,080	--	41	52	64	76	83	90	96	100			SBWCM
Do.	1815		93	5,580	1,400	--	64	73	80	81	84	91	98	100			SBWCM
July 1	1940		290	23,000	18,000	43	62	78	92	94	96	99	100	--			SPWCM
July 2	1410		213	11,600	6,670	--	52	72	77	83	88	96	99	100			SPWCM
Do.	2010		75	12,300	2,490	--	80	89	97	98	99	100	--	--			SPWCM
8-0225. SABINE RIVER AT LOGANSPORT, LA.																	
Apr. 7, 1961	0930		9,860	80	2,130						46	63	95	100			S
Do.	0930		9,860	a36	--						83	100	--	--			S
May 4, 1962	1045		10,600	150	4,290						32	50	93	100			S
Do.	1045		10,600	a44	--						68	86	100	--			S
8-0285. SABINE RIVER NEAR BON WIER, TEX.																	
Apr. 4, 1957	1430	67	12,800	402	13,900	--	54	59	65	72	81	93	99	100			SPWCM
May 13	1400	75	38,700	631	65,900	16	19	21	22	27	32	58	71	100			SBWCM
Oct. 30	1200	64	9,620	150	3,900	39	47	55	60	67	71	84	99	100			SBWCM
May 15, 1958	1830	74	25,200	244	16,600	26	30	32	41	51	69	91	99	100			SBWCM
Sept. 27	1330	77	25,400	438	30,000	25	28	32	38	45	52	72	94	100			SBWCM
Mar. 19, 1959	1430	59	7,240	108	2,110	55	61	66	72	75	79	85	97	100			SBWCM
Oct. 5, 1960	1300	74	2,950	188	1,500	--	--	--	--	--	44	46	63	97			S
Nov. 16	1235	66	2,550	87	599	--	--	--	--	--	84	86	98	100			S
Dec. 21	1330	46	20,500	394	21,800	--	25	--	33	--	54	76	96	100			SPWCM
Jan. 12, 1961	1500	49	35,200	807	76,700	--	17	--	22	--	40	62	90	97			SPWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
8-0285. SABINE RIVER NEAR BON WIER, TEX.--Continued																
Jan. 12, 1961-----	1500	--	35,200	a457	--	--	--	--	--	--	28	53	96	100		S
Feb. 28----------	1350	57	19,000	202	10,400	--	--	--	--	--	42	57	90	100		S
Apr. 6-----------	1400	62	23,300	205	12,900	18	20	24	25	30	41	68	94	100		SBWCM
Do.------------	1400	62	23,300	a164	--	--	--	--	--	--	66	86	99	100		SPWCM
Sept. 15----------	0945	76	29,700	656	52,600	32	38	39	50	56	66	83	96	100		SBWCM
Do.------------	0945	76	29,700	a504	--	41	53	58	65	75	85	97	99	100		SBWCM
May 4, 1962-------	1600	76	22,400	511	30,900	--	--	--	--	--	32	49	69	99		S
Do.------------	1600	76	22,400	a216	--	--	--	--	--	--	61	90	99	100		S
8-0335. NECHES RIVER NEAR ROCKLAND, TEX.																
Sept. 15, 1961----	1310		5,340	143	2,060						73	93	99	100		S
Do.------------	1310		5,340	a129	--						79	92	97	100		S
May 3, 1962-------	1615		12,200	138	4,550						59	81	98	100		S
Do.------------	1615		12,200	a107	--						74	83	100	--		S
Nov. 30----------	1045		708	180	344						50	56	79	99		S
Do.------------	1045		708	a75	--						93	94	100	--		S
8-0410. NECHES RIVER AT EVADALE, TEX.																
Apr. 6, 1961------	0915	60	16,600	38	1,700						82	85	92	100		S
Do.------------	0915	60	16,600	a33	--						95	98	100	--		S
May 10-----------	0915	--	4,120	161	1,790						79	84	93	98		S
Do.------------	0915	--	4,120	a110	--						84	91	98	100		S
8-0428. WEST FORK TRINITY RIVER NEAR JACKSBORO, TEX.																
Apr. 25, 1962-----	1505		818	886	1,960						99	100	--	--		S
Do.------------	1505		818	a840	--						99	100	--	--		S
June 13-----------	1445		1,740	234	1,100						98	99	100	--		S
Do.------------	1445		1,740	a236	--						99	99	100	--		S
8-0503. ELM FORK TRINITY RIVER NEAR MUENSTER, TEX.																
Apr. 23, 1957-----	0700	61	510	2,100	2,890	52	57	62	72	84	94	98	99	100		SBWCM
Apr. 26-----------	0900	63	560	2,060	3,110	44	48	54	58	64	82	92	98	100		SBWCM
May 1-------------	0930	67	465	1,640	2,060	33	34	50	52	63	76	89	97	100		SBWCM
May 11------------	0820	76	345	2,020	1,880	40	43	49	52	55	67	78	91	100		SBWCM
May 13------------	1045	66	535	1,420	2,050	38	42	44	47	51	65	82	97	100		SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette, W, in distilled water;, C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
8-0503. ELM FORK TRINITY RIVER NEAR MUENSTER, TEX.--Continued																
May 18, 1957-----	0530	65	735	1,660	3,290	43	47	50	56	64	77	92	98	100		SBWCM
May 24----------	0610	67	485	2,330	3,050	42	47	51	57	64	76	90	98	100		SBWCM
Nov. 7----------	1000	56	735	2,460	4,880	46	51	52	58	62	78	88	98	100		SBWCM
Jan. 19, 1958----	1615	47	30	1,380	112	62	67	75	82	93	98	99	100	--		SBWCM
Feb. 5----------	0615	55	12	5,170	168	52	58	66	69	71	97	99	100	--		SBWCM
Mar. 6----------	1100	49	26	1,950	137	67	69	76	83	94	98	99	100	--		SBWCM
Apr. 20---------	0645	61	78	1,210	255	56	58	62	68	77	86	94	99	100		SBWCM
Apr. 30---------	0530	55	1.1	2,440	7	39	45	48	53	62	69	80	95	100		SBWCM
May 2-----------	0500	65	810	1,630	3,560	40	42	46	51	61	75	94	99	100		SBWCM
Oct. 3, 1959-----	0800	--	2,380	9,080	58,300	38	42	51	59	69	77	78	92	100		SBWCM
Oct. 10---------	1030	--	4,020	4,020	43,600	47	50	58	61	74	87	90	96	98		SBWCM
Jan. 12, 1960----	0830	--	610	2,460	4,050	49	51	57	64	70	82	86	87	90		SBWCM
Mar. 25---------	0900	--	76	488	100	45	52	56	61	64	95	99	100	--		SBWCM
June 8----------	0530	--	70	201	38	73	82	84	88	90	99	100	--	--		SBWCM
Mar. 25, 1961----	0600	--	71	3,240	621	66	67	71	80	84	98	100	--	--		SBWCM
Oct. 2----------	0730	--	98	1,540	407	72	84	89	96	98	100	--	--	--		BWCM
Oct. 10---------	0740	--	114	1,700	523	50	59	66	75	89	99	100	--	--		SBWCM
Apr. 24---------	1010	--	840	6,670	15,100	44	54	66	72	83	94	96	98	100		SBWCM
Do.------------	1300	--	350	1,600	1,510	59	70	74	80	90	97	99	100	--		SBWCM
8-0625. TRINITY RIVER NEAR ROSSER, TEX.																
Apr. 26, 1962----	1400	69	3,130	440	3,720	81	88	94	95	97	99	99	100	--		SBWCM
Do.------------	1400	69	3,130	a514	--	82	87	89	96	97	99	99	99	100		SBWCM
8-0632. PIN OAK CREEK NEAR HUBBARD, TEX.																
Nov. 4, 1956-----	0745	--	1,030	3,740	10,400	--	77	84	90	94	97	99	100	--		SPWCM
Do.------------	1300	--	1,870	3,040	15,300	73	81	86	92	96	97	99	100	--		SBWCM
Do.------------	1500	--	1,470	1,840	7,300	79	86	89	93	96	97	98	99	100		SBWCM
Dec. 20---------	1330	--	4.1	780	86	97	98	99	99	99	99	99	99	100		SBWCM
Jan. 27, 1957----	1330	36	22	4,140	246	--	85	91	94	98	99	99	100	--		SPWCM
Feb. 1----------	0600	49	484	5,830	7,600	--	66	71	80	85	96	99	100	--		SPWCM
Mar. 17---------	1830	62	48	1,290	1,670	76	82	84	88	90	91	93	98	100		SBWCM
Do.------------	2230	62	258	4,670	3,250	68	73	80	87	89	95	98	99	100		SBWCM
Mar. 18---------	1000	61	33	773	69	83	90	91	96	98	98	99	99	100		SBWCM
Mar. 21---------	0700	57	252	1,560	1,060	70	76	81	87	94	96	99	100	--		SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
						8-0632. PIN OAK CREEK NEAR HUBBARD, TEX.--Continued										
Mar. 27, 1957-----	1900	52	124	26,200	8,770	--	72	78	84	95	97	99	100	--		SPWCM
Do.-------------	2100	51	96	8,110	2,100	--	75	81	--	98	99	100	--	--		SPWCM
Mar. 31----------	1830	60	8.5	3,920	90	79	87	89	94	96	98	99	99	100		SBWCM
Apr. 20----------	0800	64	3,310	2,100	10,700	75	81	86	94	97	98	99	99	100		SBWCM
Do.-------------	1900	71	81	1,980	433	66	74	81	85	88	96	99	99	100		SBWCM
Apr. 23----------	0600	63	215	6,280	3,646	--	70	73	77	88	95	99	100	--		SPWCM
Do.-------------	0700	62	988	9,070	24,200	--	70	73	82	90	98	100	--	--		SPWCM
Apr. 24----------	1700	66	926	14,200	35,500	--	72	79	88	96	98	100	--	--		SPWCM
Do.-------------	1900	66	1,260	4,870	16,600	--	73	80	88	95	97	99	100	--		SPWCM
May 3------------	1900	70	425	2,810	3,220	58	64	72	77	86	93	99	99	100		SBWCM
May 25-----------	1900	75	96	13,500	3,500	--	62	66	72	79	99	99	100	--		SPWCM
May 31-----------	0600	71	168	8,700	3,950	--	79	85	90	96	98	100	--	--		SPWCM
June 3-----------	1530	73	252	15,000	10,200	--	74	82	87	94	99	99	100	--		SPWCM
Sept. 22---------	1600	71	27	2,360	172	67	77	82	87	93	95	97	99	100		SBWCM
Oct. 13----------	1630	63	3.6	3,560	346	--	87	93	95	99	100	--	--	--		SPWCM
Oct. 14----------	0730	63	50	3,840	518	--	84	93	98	99	100	--	--	--		SPWCM
Oct. 15----------	2430	64	364	7,000	6,880	62	68	75	81	85	95	98	99	100		SBWCM
Nov. 8-----------	0900	56	1.8	604	29	94	98	98	99	99	99	99	100	--		SBWCM
Nov. 18----------	0630	56	57	3,770	580	66	74	80	86	93	97	100	--	--		SBWCM
Nov. 24----------	0930	42	225	1,910	1,160	64	68	75	80	88	92	98	100	--		SBWCM
Mar. 23, 1958-----	0900	60	11	1,360	40	71	76	84	91	96	98	100	--	--		SBWCM
Apr. 21----------	2030	61	142	13,600	5,210	70	77	82	86	87	98	100	--	--		SBWCM
Apr. 30----------	0700	59	81	2,370	518	76	85	88	93	97	98	100	--	--		SBWCM
May 2------------	1700	67	8	1,380	30	76	80	84	88	94	98	100	--	--		SBWCM
May 29-----------	0630	72	18	2,540	1,230	74	85	90	95	96	99	100	--	--		SBWCM
Aug. 18----------	1130	75	74	5,840	1,170	62	71	77	86	92	95	99	100	--		SBWCM
Aug. 23----------	1330	78	9.3	1,780	45	82	91	95	98	99	100	--	--	--		BWCM
Sept. 11---------	1400	77	3.1	6,080	51	69	74	85	92	95	98	99	100	--		SBWCM
Sept. 16---------	1400	76	.7	2,770	5	83	92	96	99	100	--	--	--	--		BWCM
Sept. 22---------	1600	76	765	4,050	8,370	72	83	86	91	94	96	99	100	--		SBWCM
Oct. 9-----------	0700	70	15	2,750	111	79	89	93	95	96	99	100	--	--		SBWCM
Nov. 28----------	0753	42	40	2,080	225	71	78	85	88	93	96	99	100	--		SBWCM
Feb. 14, 1959-----	1516	60	166	2,000	896	62	70	76	82	89	96	98	99	100		SBWCM
Apr. 10----------	0657	--	21	6,050	343	74	85	90	94	97	98	99	100	--		SBWCM
Apr. 11----------	1150	53	508	5,020	6,890	63	71	76	81	89	94	99	100	--		SBWCM

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment: Concentration of sample (ppm)	Suspended sediment: Discharge (tons per day)	Percent finer than indicated size, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	Methods of analysis
8-0632. PIN OAK CREEK NEAR HUBBARD, TEX.--Continued																
Apr. 19, 1959-----	1449	69	310	5,380	4,500	72	83	88	94	97	99	99	100	--		SBWCM
May 11-----------	0642	62	1,100	9,920	29,500	68	72	79	88	92	96	99	100	--		SBWCM
May 23-----------	1655	70	14	1,860	70	83	94	98	100	--	--	--	--	--		BWCM
May 24-----------	0740	68	186	3,680	1,850	62	68	75	81	86	95	99	100	--		SBWCM
June 5-----------	1130	70	281	3,940	2,990	68	70	75	83	93	99	100	--	--		SBWCM
June 22----------	1044	72	1,800	2,000	9,720	71	83	89	92	95	98	98	100	--		BWCM
July 21----------	1550	78	14	3,540	134	79	98	98	98	99	99	100	--	--		BWCM
July 27----------	1840	76	25	6,500	439	--	84	90	96	100	--	--	--	--		SPWCM
Oct. 4-----------	0820	70	1,340	3,640	13,200	62	72	77	84	92	95	99	100	--		SBWCM
Nov. 4-----------	1300	68	245	896	593	84	87	91	95	99	99	100	--	--		SBWCM
Dec. 15----------	1535	58	988	1,670	4,450	64	69	76	79	87	93	98	99	100		SBWCM
Dec. 31----------	1600	42	434	3,120	3,660	--	65	69	71	83	91	99	100	--		SPWCM
Jan. 1, 1960------	1400	38	364	1,920	1,890	56	62	69	74	82	92	98	100	--		SBWCM
Feb. 3-----------	0930	49	32	2,550	220	--	80	83	88	95	99	100	--	--		SPWCM
Apr. 28----------	0620	66	35	1,940	183	83	83	89	94	97	99	100	--	--		SBWCM
Apr. 29----------	1415	64	144	13,800	5,370	--	74	78	83	91	95	99	100	--		SPWCM
May 5------------	0730	68	264	2,170	1,550	--	82	83	85	93	97	99	100	--		SPWCM
June 26----------	0800	71	186	3,310	1,660	--	79	85	89	93	97	99	100	--		SPWCM
Aug. 21----------	1000	73	1	2,440	7	--	65	--	80	--	98	99	100	--		SPWCM
Do.------------	0130	83	92	5,840	1,450	--	51	--	70	--	92	98	100	--		SPWCM
8-0665. TRINITY RIVER AT ROMAYOR, TEX.																
Sept. 26, 1958----	1430	81	21,200	1,300	74,400	61	71	75	79	82	85	95	100	--		SBWCM
Mar. 18, 1959-----	1630	62	5,050	293	4,000	70	80	86	92	95	96	99	100	--		SBWCM
Apr. 18----------	1600	66	37,200	3,350	336,000	35	41	46	52	59	70	82	99	100		SBWCM
May 20-----------	1745	78	21,200	998	57,100	44	47	50	54	58	65	81	99	100		SBWCM
Dec. 20, 1960-----	1550	--	35,000	901	85,100	--	--	--	--	--	54	78	95	96		S
Feb. 27, 1961-----	1630	--	28,300	530	40,500	--	--	--	--	--	75	89	98	100		SBWCM
Apr. 5-----------	1000	--	16,600	780	35,000	--	--	--	--	--	68	80	99	100		S
Do.------------	1000	--	16,600	a579	--	--	--	--	--	--	88	96	99	100		S
Sept. 14----------	1345	79	30,800	631	52,500	53	57	64	66	70	74	85	99	100		SBWCM
Do.------------	1345	79	30,800	a509	--	69	77	82	85	86	91	97	100	--		SBWCM
Jan. 30, 1962-----	1130	--	15,900	832	35,700	43	47	50	55	59	67	84	98	100		SBWCM
Do.------------	1130	--	15,900	a596	--	62	65	70	75	83	90	97	100	--		SBWCM
Do.------------	1630	55	15,200	776	31,800	38	45	48	52	56	63	74	99	100		SBWCM
Do.------------	1630	55	15,200	a533	--	65	67	72	76	81	89	96	100	--		SBWCM
May 3------------	1145	73	26,200	1,240	87,700	35	42	46	52	58	66	76	96	100		SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment: Concentration of sample (ppm)	Suspended sediment: Discharge (tons per day)	Percent finer than indicated size, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	Methods of analysis
8-0665. TRINITY RIVER AT ROMAYOR, TEX.--Continued																
May 3, 1962-------	1145	73	26,200	a813	--	51	63	69	73	85	93	98	100	--		SBWCM
May 5-------------	1000	74	19,300	690	36,000	53	57	62	67	72	78	86	97	100		SBWCM
Do.-------------	1000	74	19,300	a600	--	62	67	72	79	85	92	97	100	--		SBWCM
Sept. 18---------	1345	77	10,200	629	17,300	--	--	--	--	--	77	90	99	100		S
Do.-------------	1345	77	10,200	a512	--	--	--	--	--	--	92	98	100	--		S
Do.-------------	1815	77	10,200	1,230	33,900	25	31	--	34	--	43	59	98	100		SPWCM
Do.-------------	1815	77	10,200	a397	--	70	75	--	85	--	92	97	98	100		SPWCM
Sept. 19---------	0900	--	10,300	672	18,700	--	--	--	--	--	63	73	99	100		S
Do.-------------	0900	--	10,300	a433	--	--	--	--	--	--	92	98	100	--		S
Do.-------------	1530	--	10,400	588	16,500	--	--	--	--	--	70	85	98	100		S
Do.-------------	1530	--	10,400	a424	--	--	--	--	--	--	91	98	100	--		S
Sept. 20---------	0915	77	10,400	468	13,100	51	54	--	65	--	75	87	99	100		SPWCM
Do.-------------	0915	77	10,400	a377	--	42	49	--	61	--	93	98	100	--		SPWCM
8-0680. WEST FORK SAN JACINTO RIVER NEAR CONROE, TEX.																
Sept. 14, 1961----	1100	--	9,900	238	6,360						43	61	89	98		S
Do.-------------	1100	--	9,900	a148	--						66	80	97	99		S
Sept. 21---------	1430	--	198	36	19						94	98	99	100		S
Do.-------------	1430	--	198	a36	--						94	97	98	99		S
Jan. 29, 1962-----	1650	--	2,920	491	3,870						45	54	82	99		S
Do.-------------	1650	--	2,920	a335	--						73	84	95	100		S
Jan. 31----------	0910	--	1,960	186	984						68	73	92	99		S
Do.-------------	0910	--	1,960	a205	--						72	80	95	100		S
Feb. 1-----------	1315	56	970	140	367						75	80	95	100		S
Do.-------------	1315	56	970	a121	--						86	91	100	--		S
May 3------------	0945	--	730	108	213						84	88	100	--		S
Do.-------------	0945	--	730	a75	--						89	94	100	--		S
Nov. 29----------	1530	--	695	233	437						72	75	85	99		S
Do.-------------	1530	--	695	a206	--						85	89	98	100		S
8-0685. SPRING CREEK NEAR SPRING, TEX.																
Sept. 14, 1961----	1030		9,180	38	942						89	93	97	100		SPWCM
Do.-------------	1030		9,180	a35							78	90	97	99		SPWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
8-0690. CYPRESS CREEK NEAR WESTFIELD, TEX.																
Sept. 14, 1961----	1000		5,090	901	12,400						49	83	98	100		S
Do.------------	1000		5,090	a722							65	91	99	100		S
8-0700. EAST FORK SAN JACINTO RIVER NEAR CLEVELAND, TEX.																
Nov. 29, 1962-----	1640		370	387	387						99	100	--	--		S
Do.------------	1640		370	a379							99	99	100	--		S
8-0805. DOUBLE MOUNTAIN FORK BRAZOS RIVER NEAR ASPERMONT, TEX.																
Sept. 5, 1950-----	1035		9,680	16,700	436,000	--	40	49	59	69	83	96	100	--		SBWCM
Do.------------	1150		13,200	14,000	499,000	37	44	55	65	75	86	97	100	--		SBWCM
Do.------------	1420		15,400	9,900	412,000	36	44	52	61	66	81	94	100	--		SBWCM
Do.------------	1845		12,400	26,400	884,000	--	39	47	61	78	91	99	100	--		SBWCM
Sept. 15---------	1720		985	17,800	47,300	76	92	97	100	--	--	--	--	--		BWCM
Sept. 22---------	1547		340	14,600	13,400	33	49	65	82	93	99	100	--	--		SBWCM
Sept. 26---------	1655		165	4,340	1,930	--	75	81	86	92	100	--	--	--		SPWCM
May 19, 1951------	0045		2,220	77,700	466,000	30	43	53	66	71	83	92	98	100		SPWCM
Do.------------	0847		1,150	34,900	108,000	--	55	70	80	87	94	99	100	--		SPWCM
Do.------------	0847		1,150	a34,600	--	--	58	72	87	93	96	99	100	--		SPWCM
Do.------------	1040		964	32,700	85,100	--	68	69	78	83	96	99	100	--		SPWCM
Do.------------	1040		964	a31,300	--	--	63	78	88	94	94	99	100	--		SPWCM
Do.------------	1023		1,000	32,300	87,200	--	63	77	85	94	95	99	100	--		SPWCM
Do.------------	1023		1,000	a32,900	--	--	63	72	86	93	96	100	--	--		SPWCM
May 21-----------	1830		280	18,600	14,100	51	66	76	83	92	95	99	100	--		SBWCM
June 2-----------	1715		545	16,800	24,700	--	50	63	73	83	94	98	100	--		SBWCM
June 13----------	1108		127	6,640	2,280	--	60	71	72	78	73	79	89	100		SBWCM
Do.------------	1108		127	a5,160	--	--	72	86	87	93	92	98	100	--		SPWCM
June 15----------	1010		4,260	53,000	610,000	--	36	46	58	77	90	98	99	100		SPWCM
June 17----------	1849		435	7,720	9,070	--	71	85	94	98	100	--	--	--		SPWCM
June 18----------	0940		276	5,080	3,790	51	71	88	94	96	100	--	--	--		BWCM
July 3-----------	1940		320	8,820	7,620	60	76	87	95	99	99	100	--	--		SBWCM
July 5-----------	1930		72	1,600	311	33	49	70	74	79	86	98	100	--		SBWCM
July 25----------	1630		33	2,390	213	47	58	71	74	77	82	96	100	--		SBWCM
Do.------------	1340		29	2,250	176	55	75	90	98	99	99	100	--	--		SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment: Concentration of sample (ppm)	Suspended sediment: Discharge (tons per day)	Percent finer than indicated size, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	Methods of analysis
8-0805. DOUBLE MOUNTAIN FORK BRAZOS RIVER NEAR ASPERMONT, TEX.--Continued																
Aug. 22, 1591----	0750		96	23,200	6,010	--	76	86	93	93	96	99	100	--		SPWCM
Do.------------	0855		102	22,000	6,060	--	74	85	91	91	94	98	100	--		SPWCM
Do.------------	0855		102	a21,600	--	--	69	89	94	95	96	99	100	--		SPWCM
Do.------------	0920		100	19,900	5,370	--	74	87	93	94	95	99	100	--		SPWCM
Do.------------	0920		100	a19,900	--	--	73	86	91	91	93	96	100	--		SPWCM
Aug. 23---------	0820		4,830	36,300	473,000	41	49	61	74	87	94	99	100	--		SPWCM
8-0855. CLEAR FORK BRAZOS RIVER AT FORT GRIFFIN, TEX.																
Apr. 16, 1950----	0825		389	1,780	1,870	43	80	92	98	99	100	--				BWCM
Apr. 17---------	1547		2,440	3,280	21,600	44	69	87	96	99	100	--				BWCM
Do.------------	1715		2,320	3,550	22,200	46	71	93	97	100	--	--				BWCM
Apr. 18---------	0845		1,740	3,040	14,300	49	82	92	98	99	100	--				BWCM
Do.------------	1115		1,700	2,920	13,400	66	85	91	96	98	99	100				SBWCM
Do.------------	1750		1,640	2,690	11,900	59	82	92	95	99	100	--				BWCM
Apr. 19---------	1115		650	2,330	4,090	65	79	93	98	98	100	--				BWCM
May 13----------	0745		664	806	1,440	67	80	84	93	98	100	--				BWCM
May 17----------	1800		274	1,810	1,340	79	94	96	97	99	100	--				BWCM
May 19----------	1030		113	382	117	96	100	--	--	--	--	--				BWCM
May 26----------	2430		1,170	2,340	7,390	66	76	88	95	97	100	--				BWCM
May 27----------	0800		2,220	5,310	31,800	75	80	91	95	96	100	--				BWCM
May 28----------	0900		2,730	3,240	23,900	43	70	83	93	96	100	--				BWCM
Do.------------	1800		3,500	7,390	69,800	69	82	88	96	98	100	--				BWCM
May 29----------	2230		3,120	3,450	29,100	83	84	94	98	98	100	--				BWCM
July 13---------	0830		281	3,340	2,530	52	67	76	83	91	98	100				SBWCM
July 27---------	1445		1,530	1,800	7,440	51	62	71	80	92	100	--				BWCM
Aug. 6----------	1025		166	513	230	96	100	--	--	--	--	--				BWCM
Sept. 6---------	1600		740	972	1,940	77	89	94	98	100	--	--				BWCM
Sept. 8---------	1900		2,480	4,140	27,700	72	84	92	97	98	99	100				SBWCM
May 20, 1951-----	0920		1,460	2,370	9,340	63	80	84	95	100	--	--				BWCM
May 26----------	1400		1,200	1,470	4,760	79	84	91	96	98	100	--				BWCM
June 4----------	0730		1,340	2,500	9,040	64	67	77	87	95	99	100				SBWCM
June 12---------	1745		2,690	5,360	38,900	--	72	87	94	96	98	100				SBWCM
June 13---------	1845		3,010	5,820	47,300	67	81	89	94	98	99	100				SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
8-0855. CLEAR FORK BRAZOS RIVER AT FORT GRIFFIN, TEX.--Continued																
June 14, 1951-----	2220		2,380	3,140	20,200	69	82	88	96	99	100	--				BWCM
June 15----------	2445		766	2,240	4,630	73	87	93	97	98	99	100				SBWCM
June 16----------	0730		2,130	3,620	20,800	--	74	77	95	97	99	100				SBWCM
June 17----------	0840		1,630	2,470	10,900	65	73	84	93	98	99	100				SBWCM
July 4-----------	0800		878	1,030	2,440	81	99	100	--	--	--	--				BWCM
July 5-----------	1840		982	1,200	3,180	82	90	92	96	97	98	99	100			SBWCM
8-0880. BRAZOS RIVER NEAR SOUTH BEND, TEX.																
June 11, 1962-----	1930	--	20,200	5,100	278,000	50	57	--	72	--	90	94	99	100		SPWCM
Do.-------------	1930	--	20,200	a4,300	--	57	66	--	82	--	97	99	100	--		SPWCM
June 12----------	1530	--	12,600	6,120	208,000	54	66	--	91	--	94	96	99	100		SPWCM
Do.-------------	1530	--	12,600	a5,980	--	54	66	--	92	--	96	98	100	--		SPWCM
June 13----------	0900	--	9,800	3,640	96,300	69	75	--	86	--	88	91	98	100		SPWCM
Do.-------------	0900	--	9,800	a2,900	--	62	72	--	86	--	94	97	99	100		SPWCM
June 20----------	0900	--	1,240	8,670	29,000	67	78	--	83	--	99	100	--	--		SPWCM
Do.-------------	0900	--	1,240	a7,320	--	64	78	--	83	--	100	--	--	--		SPWCM
Sept. 9----------	1540	73	42,900	4,080	473,000	41	47	--	55	--	63	77	89	97		SPWCM
Do.-------------	1540	73	42,900	a2,470	--	70	75	--	86	--	92	98	100	--		SPWCM
Sept. 10---------	0915	--	27,600	3,140	234,000	51	57	65	75	--	93	97	99	100		SPWCM
Do.-------------	0915	--	27,600	a2,920	--	60	65	69	80	--	96	99	100	--		SPWCM
8-1005. LEON RIVER AT GATESVILLE, TEX.																
Oct. 10, 1961-----	1415	73	16,000	1,550	67,000	63	78	91	95	98	99	99	100	--		SBWCM
Do.-------------	1500	73	16,000	a1,450	--	63	82	95	96	97	99	100	--	--		SBWCM
Sept. 8, 1962-----	1645	--	2,240	3,170	19,200	56	74	84	91	--	99	100	--	--		SPWCM
Do.-------------	1645	--	2,240	a2,990	--	54	68	82	90	--	99	100	--	--		SPWCM
Sept. 11---------	1745	--	6,890	1,440	26,800	70	71	79	82	--	94	97	99	100		SPWCM
Do.-------------	1745	--	6,890	a1,280	--	80	82	85	88	--	97	99	100	--		SPWCM
Sept. 12---------	0900	--	8,550	871	20,100	56	56	77	88	--	93	98	99	100		SPWCM
Do.-------------	0900	--	8,550	a671	--	90	90	92	92	--	99	100	--	--		SPWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment: Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	Methods of analysis
8-1140. BRAZOS RIVER AT RICHMOND, TEX.																
Apr. 3, 1957------	1130	69	8,460	3,880	88,600	--	79	85	90	92	93	97	100	--		SPWC
Apr. 24----------	1630	74	31,800	6,760	580,000	--	68	79	84	90	92	96	99	100		SPWC
May 7------------	1200	72	107,000	2,240	647,000	--	38	43	48	56	64	77	95	100		SPWC
May 14-----------	1030	75	59,000	3,000	47,800	--	51	60	69	79	88	96	99	100		SPWC
Oct. 18----------	1300	67	85,500	7,070	1,630,000	--	57	65	72	81	87	95	99	100		SPWC
Oct. 24----------	1730	67	51,300	4,240	587,000	--	41	46	52	61	72	91	98	100		SPWC
May 9, 1958-------	1830	74	31,500	3,190	271,000	--	47	52	59	73	84	96	99	100		SPWC
Feb. 15, 1961-----	1545	--	23,700	1,610	103,000	--	51	--	64	--	81	95	99	100		SPWC
Do.------------	1545	--	23,700	a1,610	--	--	--	--	--	--	83	98	100	--		S
Apr. 4-----------	1615	--	7,310	690	13,600	--	--	--	--	--	95	100	--	--		S
Do.------------	1615	--	7,310	a688	--	--	--	--	--	--	96	100	--	--		S
Sept. 13---------	1715	75	39,900	5,650	609,000	37	43	47	54	--	78	93	99	100		SPWC
Do.------------	1715	75	39,900	a5,000	--	36	47	54	61	--	82	96	100	--		SPWC
Nov. 14----------	1515	--	8,250	1,200	26,700	53	60	66	74	84	95	99	100	--		SBWC
Do.------------	1515	--	8,250	a1,220	--	56	62	67	73	85	95	99	100	--		SBWC
Jan. 31, 1962-----	1100	--	9,100	1,080	26,500	58	61	63	68	73	78	94	100	--		SBWC
Do.------------	1100	--	9,100	a826	--	75	77	81	84	88	93	99	100	--		SBWC
Sept. 17---------	1530	75	20,300	3,340	183,000	44	46	--	59	--	75	87	95	99		SPWC
Do.------------	1530	75	20,300	a2,230	--	60	64	--	81	--	94	98	100	--		SPWC
8-1240. COLORADO RIVER AT ROBERT LEE, TEX.																
Apr. 16, 1950-----	0630		847	4,460	10,200	27	36	57	71	82	89	92	94	97		SBWCM
Do.------------	1250		2,500	5,400	36,500	27	52	64	77	87	97	99	100	--		SBWCM
Do.------------	1510		3,480	9,330	87,700	20	30	49	64	78	92	96	97	98		SBWCM
Do.------------	1730		4,480	12,800	155,000	32	47	60	76	85	92	96	98	100		SBWCM
Apr. 17----------	0730		4,260	15,000	173,000	29	46	61	73	81	94	98	99	100		SBWCM
Do.------------	1130		3,920	14,900	158,000	32	49	65	78	87	93	97	98	100		SBWCM
Apr. 18----------	1535		431	5,940	6,910	43	65	80	91	93	97	98	100	--		SBWCM
May 12-----------	0930		8,960	18,300	443,000	47	59	72	79	84	94	98	99	100		SBWCM
Do.------------	1220		9,380	22,500	570,000	44	57	67	76	82	87	91	97	99		SBWCM
May 13-----------	0915		1,760	14,700	70,000	57	69	80	90	95	98	99	100	--		SBWCM
Do.------------	1700		1,190	11,500	36,900	62	81	87	94	96	98	98	100	--		SBWCM
May 16-----------	1730		252	1,380	939	84	96	99	100	--	--	--	--	--		SBWCM
May 26-----------	0800		356	1,030	990	58	69	78	84	94	98	100	--	--		SBWCM
Do.------------	1620		702	4,310	8,170	40	54	59	68	75	80	86	97	100		SBWCM
May 27-----------	0645		4,940	20,100	268,000	47	57	66	75	83	87	93	99	100		SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment													Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters											
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000		
8-1240. COLORADO RIVER AT ROBERT LEE, TEX.--Continued																	
May 27, 1950	0915		5,290	15,200	217,000	45	52	62	71	80	86	93	98	100			SBWCM
May 28	0727		3,480	9,430	88,600	39	49	56	64	69	76	87	99	100			SBWCM
Do.	1430		2,000	7,540	40,700	41	56	62	67	74	80	86	97	100			SBWCM
June 7	1000		342	1,040	960	65	76	81	86	90	96	97	99	100			SBWCM
June 12	1800		1,150	10,600	32,900	64	78	83	89	92	94	96	99	100			SBWCM
July 6	1630		66	1,340	239	81	85	97	99	100	--	--	--	--			BWCM
July 12	1730		209	5,190	2,930	81	94	97	99	100	--	--	--	--			BWCM
July 26	1800		324	8,300	7,260	75	85	93	98	100	--	--	--	--			BWCM
July 28	0730		770	2,440	5,070	64	77	87	91	92	93	94	99	100			SBWCM
Aug. 3	1700		189	2,350	1,200	82	92	97	98	99	100	--	--	--			BWCM
Aug. 17	1500		1,450	7,570	29,600	56	64	76	88	94	96	97	98	100			SBWCM
Sept. 4	1900		126	2,450	833	74	84	94	98	100	--	--	--	--			BWCM
Sept. 7	1300		990	13,000	34,700	63	78	89	96	98	99	100	--	--			SBWCM
Sept. 10	1530		262	4,940	3,490	84	92	97	99	100	--	--	--	--			BWCM
Sept. 22	0820		777	9,970	20,900	--	81	92	100	--	--	--	--	--			SPWCM
Sept. 24	1730		165	3,960	1,760	--	94	97	97	99	100	--	--	--			SPWCM
May 19, 1951	1200		1,510	12,500	51,000	53	64	77	86	94	96	98	100	--			SPWCM
May 21	1245		302	6,770	5,520	--	47	56	67	76	91	98	100	--			SPWCM
May 22	0019		410	7,770	8,600	--	53	68	81	95	98	100	--	--			SPWCM
June 3	1930		3,350	13,800	125,000	38	52	63	75	88	95	99	100	--			SBWCM
June 7	1300		189	9,260	4,720	--	91	94	95	98	100	--	--	--			SPWCM
June 16	1030		2,420	17,000	111,000	--	61	73	83	87	95	98	100	--			SPWCM
July 3	0830		3,240	17,600	154,000	--	55	64	77	84	90	96	100	--			SPWCM
July 6	1900		214	7,120	4,100	--	86	97	97	98	100	--	--	--			SPWCM
Aug. 12	1230		220	2,270	1,350	54	74	82	94	97	98	100	--	--			SBWCM
Aug. 23	0930		3,130	32,400	274,000	55	68	79	88	93	98	99	100	--			SBWCM
Do.	1530		2,520	23,900	163,000	--	73	83	91	96	98	100	--	--			SPWCM
Aug. 26	1830		296	7,500	5,990	--	89	92	92	96	100	--	--	--			SPWCM
8-1470. COLORADO RIVER NEAR SAN SABA, TEX.																	
May 8, 1951	1800	--	440	2,980	3,540	84	92	95	99	100	--	--	--	--			BWCM
May 22	1320	--	711	828	1,600	59	74	82	90	94	100	--	--	--			BWCM
Do.	2020	--	6,640	12,200	219,000	--	78	87	97	99	100	--	--	--			SPWCM
May 23	1222	--	11,400	7,700	237,000	--	77	90	99	100	--	--	--	--			SPWCM
May 26	0800	--	20,100	5,090	276,000	57	70	81	90	86	99	100	--	--			SPWCM

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
8-1470. COLORADO RIVER NEAR SAN SABA, TEX.--Continued																
June 16, 1951-----	1800	--	4,910	1,640	21,700	65	81	89	95	99	100	--	--	--		
July 6-----------	1800	--	2,460	1,780	11,800	75	78	84	92	96	100	--	--	--		
Apr. 22, 1952-----	1325	--	6,100	6,880	113,000	--	74	84	96	98	100	--	--	--		SPWCM
Do.-------------	1325	--	6,100	a7,070	--	--	73	82	96	98	100	--	--	--		SPWCM
Do.-------------	1730	--	5,690	6,040	92,800	--	74	85	93	96	100	--	--	--		SPWCM
Do.-------------	1730	--	5,690	a6,460	--	--	73	85	95	98	100	--	--	--		SPWCM
Do.-------------	2400	--	4,410	6,900	82,200	56	69	81	91	97	100	--	--	--		BWCM
Do.-------------	2400	--	4,410	a7,180	--	--	74	82	94	98	100	--	--	--		SPWCM
Apr. 23----------	0720	--	3,810	6,060	62,300	--	72	83	92	96	100	--	--	--		SPWCM
Do.-------------	0720	--	3,810	a6,160	--	--	74	84	90	96	100	--	--	--		SPWCM
Do.-------------	0855	--	4,170	5,470	61,600	--	77	88	95	98	100	--	--	--		SPWCM
Do.-------------	0855	--	4,170	a5,700	--	--	74	88	94	98	100	--	--	--		SPWCM
Do.-------------	1205	--	5,040	4,900	66,700	--	73	85	93	98	100	--	--	--		SPWCM
Do.-------------	1205	--	5,040	a4,840	--	--	76	92	95	99	99	100	--	--		SPWCM
Do.-------------	1910	--	6,100	7,700	127,000	--	62	75	83	91	100	--	--	--		SPWCM
Do.-------------	1910	--	6,100	a7,660	--	--	66	77	86	92	99	100	--	--		SPWCM
Apr. 24----------	1300	--	3,810	5,920	61,000	--	69	86	95	100	--	--	--	--		SPWCM
Do.-------------	1300	--	3,810	a6,200	--	--	76	79	94	97	100	--	--	--		SPWCM
May 1------------	2040	--	5,300	5,180	74,100	--	76	84	95	99	99	100	--	--		SPWCM
Do.-------------	2310	--	7,890	16,400	349,000	61	71	80	94	97	99	100	--	--		SPWCM
Do.-------------	2310	--	7,980	a16,800	--	--	73	85	98	99	99	100	--	--		SPWCM
May 2------------	0435	--	11,300	11,500	351,000	--	66	81	92	99	99	100	--	--		SPWCM
Do.-------------	0940	--	12,900	6,960	242,000	--	75	87	95	97	99	100	--	--		SPWCM
Do.-------------	0940	--	12,900	a6,830	--	--	77	88	95	98	99	99	100	--		SPWCM
Do.-------------	1600	--	12,600	5,340	182,000	--	79	88	94	99	99	100	--	--		SPWCM
Do.-------------	1600	--	12,600	a5,630	--	--	77	86	92	96	99	100	--	--		SPWCM
May 3------------	0420	--	5,690	4,930	75,700	--	77	87	97	98	100	--	--	--		SPWCM
Do.-------------	0420	--	5,690	a4,950	--	--	80	94	95	99	100	--	--	--		SPWCM
Do.-------------	1300	--	2,210	3,980	23,700	65	77	87	95	99	100	--	--	--		BWCM
Do.-------------	1300	--	2,210	a4,180	--	63	78	88	97	99	100	--	--	--		BWCM
May 4------------	0845	--	1,210	4,040	132,000	--	64	75	85	93	100	--	--	--		SPWCM
May 19-----------	1500	--	14,200	5,270	202,000	60	69	81	91	97	98	100	--	--		SPWCM
Do.-------------	1500	--	14,200	a5,380	--	--	73	83	92	95	99	100	--	--		SPWCM
Do.-------------	1755	--	13,600	5,330	196,000	--	73	84	94	97	99	100	--	--		SPWCM
Do.-------------	2400	--	9,900	4,250	114,000	63	75	87	95	98	100	--	--	--		BWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment													Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters											
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000		
8-1470. COLORADO RIVER NEAR SAN SABA, TEX.--Continued																	
May 19, 1952------	2400	--	9,900	a4,300	--	76	84	93	98	99	100	--	--	--			SPWCM
May 20-----------	1138	--	3,540	3,300	31,500	64	77	85	94	98	100	--	--	--			BWCM
May 24-----------	1830	--	7,360	3,920	77,900	--	76	88	95	96	98	100	--	--			SPWCM
May 25-----------	1200	--	11,500	5,560	173,000	--	67	80	91	96	99	100	--	--			SPWCM
June 3-----------	1900	--	2,020	6,100	33,300	62	74	85	95	98	100	--	--	--			BWCM
Sept. 11----------	0700	--	50,700	4,120	564,000	--	61	77	89	94	95	98	100	--			SPWCM
Do.------------	1500	--	68,800	2,140	398,000	64	79	84	93	97	98	99	100	--			SBWCM
Sept. 12---------	0150	--	50,700	3,440	471,000	61	76	86	95	99	100	--	--	--			BWCM
Do.------------	0150	--	50,700	a3,470	--	69	77	86	95	98	99	100	--	--			SBWCM
Do.------------	1600	--	31,100	2,870	241,000	62	75	83	94	97	99	100	--	--			SBWCM
Do.------------	1600	--	31,000	a2,820	--	43	64	78	92	96	99	100	--	--			SBWCM
Nov. 26----------	1100	--	2,740	3,240	24,000	--	62	73	87	92	100	--	--	--			SPWCM
Mar. 10, 1953-----	1310	--	12,600	4,160	142,000	51	59	72	83	92	99	100	--	--			SBWCM
May 15-----------	1140	--	10,400	4,340	122,000	64	80	90	94	96	99	100	--	--			SPWCM
May 22-----------	0800	--	972	910	2,390	59	78	95	99	100	--	--	--	--			SBWCM
Aug. 23----------	1805	--	15,300	1,510	62,400	91	94	96	100	--	--	--	--	--			SBWCM
Oct. 4-----------	1935	--	10,900	7,990	235,000	52	66	77	88	93	99	100	--	--			SPWCM
Oct. 30----------	0800	--	1,060	3,400	9,730	69	85	92	99	100	--	--	--	--			SBWCM
Apr. 14, 1954-----	1110	--	14,900	5,630	226,000	68	77	90	97	99	100	--	--	--			SBWCM
Apr. 30----------	0830	--	9,100	7,830	192,000	47	62	75	87	94	99	100	--	--			SPWCM
May 26-----------	1140	--	15,300	1,920	79,300	71	79	89	97	100	--	--	--	--			SBWCM
Oct. 29----------	0800	--	590	1,620	2,580	73	91	97	99	99	100	--	--	--			SBWCM
Nov. 14----------	1400	--	11,800	7,940	253,000	--	55	79	81	92	98	99	100	--			SPWCM
Apr. 10, 1955-----	1800	--	1,220	1,700	5,600	79	88	96	99	99	100	--	--	--			SBWCM
June 17----------	1800	--	6,250	2,500	42,200	49	64	70	87	98	100	--	--	--			SBWCM
July 20----------	0800	--	21,700	2,540	149,000	53	62	74	87	92	99	100	--	--			SBWCM
Sept. 24---------	1800	--	30,100	2,280	185,000	58	73	85	90	96	99	100	--	--			SBWCM
Oct. 3-----------	0800	--	1,200	3,140	10,200	68	82	92	98	100	--	--	--	--			SBWCM
Oct. 7-----------	0800	--	2,040	3,820	21,000	--	74	87	93	93	100	--	--	--			SPWCM
Apr. 30, 1956-----	1720	--	6,920	13,300	248,000	42	57	72	85	94	98	99	100	--			SPWCM
May 3------------	1730	--	52,500	2,670	378,000	--	80	91	98	98	100	--	--	--			SPWCM
Mar. 21, 1957-----	1430	--	7,520	2,980	60,500	68	73	80	87	90	92	94	99	100			SPWCM
Mar. 30----------	0827	--	1,520	746	3,060	77	81	85	90	92	94	95	100	--			SPWCM
Apr. 4-----------	0816	--	864	581	1,360	94	95	95	97	97	100	--	--	--			BWCM
Apr. 29----------	1730	--	60,200	1,820	296,000	67	73	78	84	86	87	89	98	100			SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment														Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters												
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000			
8-1470. COLORADO RIVER NEAR SAN SABA, TEX.--Continued																		
May 14, 1957------	1830	--	25,800	826	57,500	52	60	65	73	80	86	92	100	--				SBWCM
Sept. 26---------	1030	--	52,500	2,780	394,000	45	49	55	59	64	68	73	91	99				SBWCM
Oct. 12----------	0800	65	1,810	2,060	10,100	57	75	90	98	99	100	--	--	--				BWCM
Oct. 16----------	1100	66	43,000	2,090	243,000	57	75	83	92	97	99	100	--	--				SBWCM
Nov. 3-----------	0830	60	3,880	3,360	35,200	39	52	65	79	92	98	100	--	--				SBWCM
Feb. 24, 1958-----	0800	50	11,200	2,030	61,400	49	64	69	84	93	98	100	--	--				SBWCM
May 1------------	0800	52	2,250	2,040	12,400	60	74	83	93	98	100	--	--	--				SBWCM
June 23----------	1015	78	2,530	1,430	9,770	68	80	88	95	98	99	100	--	--				SBWCM
Oct. 1-----------	0800	56	1,280	1,620	5,600	68	80	93	96	98	100	--	--	--				SBWCM
May 24, 1959------	0800	65	3,400	2,400	22,000	54	79	82	94	99	100	--	--	--				SBWCM
June 6-----------	1715	75	18,300	1,430	70,700	65	76	84	92	97	99	100	--	--				SBWCM
July 20----------	1750	79	7,360	1,870	37,200	52	67	72	89	97	100	--	--	--				BWCM
Oct. 4-----------	1500	--	27,600	1,730	129,000	53	68	80	86	94	99	100	--	--				SBWCM
Jan. 6, 1960------	0800	42	9,580	1,720	44,500	56	59	69	78	90	98	99	100	--				SBWCM
Feb. 4-----------	0800	50	3,360	769	6,980	60	69	78	82	93	98	100	--	--				SBWCM
May 24, 1962------	1340	72	1,250	4,000	13,500	70	80	87	98	99	99	100	--	--				SBWCM
July 29----------	0700	80	1,520	1,670	6,850	86	92	97	99	99	99	100	--	--				SBWCM
8-1610. COLORADO RIVER AT COLUMBUS, TEX.																		
Mar. 21, 1957-----	1915	66	7,520	3,610	73,300	--	70	80	88	93	95	96	99	100				SBWCM
Do.-------------	1430	66	7,520	2,980	60,500	68	73	80	87	90	92	94	99	100				SBWCM
Mar. 22----------	0920	65	5,840	2,600	41,000	--	75	82	89	90	93	93	99	100				SBWCM
Mar. 23----------	1027	67	6,680	4,000	72,100	--	65	66	71	74	76	76	95	100				SPWCM
Mar. 24----------	0827	60	3,410	5,600	51,600	--	88	94	95	96	100	--	--	--				SPWCM
Mar. 30----------	0827	62	1,520	746	3,060	77	81	85	90	92	94	95	100	--				SBWCM
Apr. 1-----------	1128	63	4,330	5,760	67,300	40	48	52	56	57	61	61	76	100				SBWCM
Apr. 2-----------	1110	68	2,250	1,570	9,540	--	88	93	96	97	99	99	100	--				SPWCM
Apr. 4-----------	0816	68	864	581	1,360	94	95	95	97	97	100	--	--	--				SBWCM
Apr. 24----------	0730	73	3,630	1,390	13,600	76	78	83	87	88	88	90	97	100				SBWCM
Apr. 25----------	0740	73	5,570	2,580	38,800	--	82	85	90	93	94	95	98	100				SPWCM
Do.-------------	1355	76	4,600	1,970	24,500	--	87	91	94	96	97	97	99	100				SPWCM
Apr. 26----------	1624	75	8,100	3,520	77,000	--	85	89	90	92	94	95	99	100				SPWCM
Apr. 27----------	1340	73	31,600	4,380	374,000	--	56	67	71	74	76	77	88	100				SPWCM
Do.-------------	1730	70	29,500	4,200	335,000	63	79	84	90	95	97	98	100	--				SBWCM

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment													Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters											
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000		
8-1610. COLORADO RIVER AT COLUMBUS, TEX.--Continued																	
Apr. 28, 1957-----	2200	67	54,000	2,820	411,000	60	67	75	81	84	88	96	98	100			SBWCM
Apr. 29----------	1730	68	60,200	1,820	296,000	67	73	78	84	86	87	89	98	100			SBWCM
May 1------------	0750	67	26,100	2,740	193,000	74	82	87	93	95	97	98	99	100			SBWCM
May 5------------	1600	68	30,400	780	64,000	45	49	54	61	65	71	78	97	100			SBWCM
May 9------------	1645	69	13,000	448	15,700	--	53	63	75	86	91	96	100	--			SPWCM
May 14-----------	1830	73	25,800	826	57,500	52	60	65	73	80	86	92	100	--			SBWCM
May 21-----------	2430	74	36,800	562	55,800	45	49	55	65	72	78	84	100	--			SBWCM
May 30-----------	1100	76	16,400	2,140	94,800	52	62	64	78	85	95	98	100	--			SBWCM
June 1-----------	0800	73	36,000	647	62,900	31	37	42	52	57	75	84	100	--			SBWCM
June 5-----------	1445	73	32,100	2,080	180,000	--	51	58	68	77	82	87	95	100			SPWCM
June 14----------	1730	81	46,100	2,090	260,000	65	74	78	83	87	93	95	99	100			SBWCM
June 30----------	1730	80	11,200	1,100	33,300	62	65	68	72	81	90	97	100	--			SBWCM
Sept. 25---------	0730	70	9,460	2,000	51,100	59	67	70	77	82	86	91	99	100			SBWCM
Sept. 26---------	1030	66	52,500	2,780	394,000	45	49	55	59	64	68	73	95	100			SBWCM
Do.--------------	1630	69	61,000	1,940	320,000	--	46	51	57	62	69	73	91	100			SPWCM
Oct. 15----------	1100	66	51,300	2,440	338,000	59	66	71	80	87	90	95	98	100			SBWCM
Oct. 17----------	0730	68	44,900	2,100	255,000	69	76	82	87	90	92	95	99	100			SBWCM
Do.--------------	1730	70	36,800	2,570	255,000	--	74	83	89	91	94	95	98	100			SBWCM
Oct. 21----------	0715	68	16,200	896	39,200	37	44	48	54	61	68	80	97	100			SPWCM
Nov. 23----------	0735	50	18,400	1,060	52,700	56	64	66	72	78	85	94	98	100			SBWCM
Feb. 23, 1958-----	1400	53	62,900	2,830	480,000	--	53	57	64	72	75	82	94	100			SBWCM
May 4------------	1745	67	24,000	2,320	150,000	--	47	51	62	72	82	90	99	100			SPWCM
June 20----------	0721	80	10,600	2,090	59,800	65	80	89	96	97	98	99	100	--			SPWCM
July 9-----------	1155	80	6,670	382	6,880	66	70	78	83	83	90	94	99	100			SBWCM
Sept. 8----------	1405	79	4,730	744	9,500	50	66	73	82	88	91	93	99	100			SBWCM
Sept. 22---------	1650	79	24,600	2,550	169,000	67	78	83	86	87	90	93	98	100			SBWCM
Oct. 2-----------	0715	68	5,570	1,020	15,300	70	81	85	91	95	97	99	100	--			SBWCM
Oct. 15----------	0722	72	2,100	1,580	9,000	82	93	98	99	99	100	--	--	--			BWCM
Oct. 31----------	0738	60	5,980	1,080	17,400	58	60	64	67	70	72	74	83	99			SBWCM
Nov. 14----------	0744	72	8,400	2,150	48,800	60	65	72	77	82	90	92	96	100			SBWCM
Feb. 16, 1959-----	0746	56	9,460	1,440	36,800	62	62	67	71	87	89	90	94	100			SBWCM
Apr. 9-----------	1700	61	8,550	3,350	77,300	55	60	68	73	75	77	78	88	99			SBWCM
Apr. 10----------	1330	61	14,800	1,420	56,700	60	65	72	77	82	85	89	97	99			SBWCM
Apr. 12----------	1000	60	30,400	1,830	150,000	56	61	67	73	78	84	86	95	100			SBWCM
Apr. 18----------	0736	66	23,200	3,360	210,000	52	61	69	75	81	85	89	98	100			SBWCM

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment: Concentration of sample (ppm)	Suspended sediment: Discharge (tons per day)	Percent finer than indicated size, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	Methods of analysis
8-1610. COLORADO RIVER AT COLUMBUS, TEX.--Continued																
May 11, 1959------	0742	67	7,100	1,250	24,000	54	61	68	75	84	94	99	100	--		SBWCM
May 23------------	0945	67	14,400	2,560	99,500	50	58	65	70	79	86	93	99	100		SBWCM
Dec. 18-----------	0755	55	5,180	876	12,300	75	84	92	93	95	96	97	100	--		SBWCM
Jan. 1, 1960------	0845	53	6,680	912	16,400	70	77	80	88	93	96	97	99	100		SBWCM
Feb. 4------------	0739	51	10,400	1,200	33,700	46	62	66	68	75	80	81	87	96		BWCM
Apr. 30-----------	1045	68	64,000	2,370	410,000	--	43	51	55	61	64	68	85	99		SPWCM
Do.-------------	1615	68	61,000	1,710	282,000	--	49	55	60	67	69	74	87	99		SPWCM
May 1-------------	1030	68	35,000	1,220	115,000	--	70	76	81	85	88	92	97	100		SPWCM
Do.-------------	1445	68	25,800	906	63,100	--	68	74	78	82	86	90	96	100		SPWCM
June 25-----------	0958	75	14,800	2,450	97,900	--	57	--	69	--	84	91	98	100		SPWCM
Oct. 30-----------	0925	71	35,700	2,020	195,000	--	51	--	62	--	73	77	89	99		SPWCM
Oct. 31-----------	1200	67	55,400	1,950	292,000	--	71	--	77	--	86	89	95	99		SPWCM
Feb. 18, 1961-----	1235	65	19,100	2,320	120,000	--	70	--	84	--	93	96	98	100		SPWCM
Feb. 19-----------	1505	67	19,800	2,400	128,000	58	68	77	83	88	92	95	99	100		SBWCM
June 20-----------	0920	80	55,000	1,970	293,000	59	62	--	68	--	74	77	85	98		SPWCM
8-1640. LAVACA RIVER NEAR EDNA, TEX.																
Sept. 13, 1961----	1130	79	13,600	244	9,000	75	76	78	88	96	99	99	100	--		SBWCM
Do.-------------	1130	79	13,600	a224	--	77	79	83	89	95	100	--	--	--		BWCM
Nov. 14-----------	1730	65	7,260	335	6,570	75	81	85	85	89	93	97	98	100		SBWCM
Do.-------------	1730	65	7,260	a241	--	--	--	--	--	--	93	97	98	100		S
Nov. 15-----------	1130	64	10,400	103	2,890	--	--	--	--	--	97	98	99	100		S
Do.-------------	1130	64	10,400	a108	--	--	--	--	--	--	94	94	99	100		S
Sept. 19, 1962----	0835	81	920	674	1,670	--	--	--	--	--	99	100	--	--		S
Do.-------------	0825	81	920	a675	1,670	--	--	--	--	--	99	100	--	--		S
8-1765. GUADALUPE RIVER AT VICTORIA, TEX.																
Sept. 23, 1958----	1400	83	7,570	694	14,200	54	70	79	91	95	98	100				SBWCM
Apr. 11, 1959-----	1100	63	4,680	1,800	22,700	67	80	87	91	92	93	100				SBWCM
Apr. 13-----------	1200	61	8,150	1,230	27,100	66	76	79	82	82	83	100				SBWCM
Sept. 12, 1961----	1730	78	3,100	258	2,160	84	90	92	95	95	96	100				SBWCM
Do.-------------	1730	78	3,100	a261	--	86	90	92	96	98	98	99	100			SBWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment: Concentration of sample (ppm)	Suspended sediment: Discharge (tons per day)	Percent finer than indicated size, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	Methods of analysis
8-1835. SAN ANTONIO RIVER NEAR FALL CITY, TEX.																
July 8, 1958------	1205	89	444	493	591	77	85	96	99	99	100	--	--			BWCM
Do.------------	1545	85	570	457	703	73	81	92	97	98	99	99	99	100		SBWCM
Do.------------	1945	--	774	671	1,400	60	74	85	93	96	100	--	--			SBWCM
Do.------------	2115	84	975	636	1,670	55	68	77	91	96	99	99	100			SBWCM
July 9-----------	0705	83	1,400	1,300	4,910	57	76	87	94	95	99	100	--			SBWCM
Do.------------	1250	--	1,650	1,460	6,500	56	74	88	93	97	99	100	--			SBWCM
Do.------------	1750	--	1,820	2,160	10,600	61	77	91	95	96	98	100	--			SBWCM
July 10----------	1115	83	1,900	853	4,380	69	79	88	93	96	98	99	100			SBWCM
May 4, 1959-------	--	--	1,050	2,730	7,740	55	67	77	82	84	87	99	100			SBWCM
May 18-----------	1315	--	908	3,160	7,750	69	80	89	96	98	99	100	--			SBWCM
Do.------------	1530	--	938	1,840	4,660	63	79	89	95	98	100	--	--			BWCM
8-1885. SAN ANTONIO RIVER AT GOLIAD, TEX.																
July 9, 1958------	1450	--	572	1,560	2,410	74	86	95	98	98	99	99	99	100		SBWCM
July 10----------	0810	--	640	500	864	71	76	84	91	95	96	97	99	100		SBWCM
Do.------------	1300	--	784	449	950	70	72	82	88	92	98	99	100	--		SBWCM
Do.------------	2150	--	1,060	774	2,220	65	74	83	90	93	98	99	100	--		SBWCM
July 11----------	0705	--	1,300	1,140	4,000	66	73	83	89	91	98	98	99	100		SBWCM
Sept. 25----------	1030	--	3,670	970	9,610	73	89	95	98	--	99	100	--	--		SBWCM
Apr. 11, 1959-----	1730	62	712	1,100	2,110	72	84	90	95	97	99	99	100	--		SBWCM
May 4------------	1900	64	2,440	1,940	12,800	78	91	97	99	99	100	--	--	--		BWCM
Nov. 14, 1961-----	1850	64	1,820	2,150	10,600	66	77	88	93	98	99	100	--	--		SBWCM
Do.------------	1850	64	1,820	a1,990	--	--	--	--	--	--	99	99	100	--		SBWCM
Nov. 15----------	0920	65	3,140	1,660	14,100	81	86	92	94	97	98	98	99	100		SBWCM
Nov. 28, 1962-----	1425	66	1,140	2,770	8,530	62	78	87	95	--	99	99	100	--		SPWCM
Do.------------	1425	--	1,140	a2,580	--	73	88	96	99	--	99	100	--	--		SPWCM
Nov. 29----------	0915	--	650	3,840	6,740	72	86	96	98	--	100	--	--	--		SPWCM
Do.------------	0915	--	650	a3,980	--	75	88	--	97	--	100	--	--	--		SPWCM
8-1945. NUECES RIVER NEAR TILDEN, TEX.																
Feb. 25, 1950-----	0715		200	970	524	63	94	96	98	100	--	--				BWCM
Feb. 26----------	0755		91	630	155	79	95	99	100	--	--	--				BWCM
Feb. 28----------	0720		16	327	14	94	96	97	100	--	--	--				BWCM
Apr. 14----------	0700		272	2,720	2,000	74	88	92	96	98	100	--				BWCM
Apr. 15----------	0715		144	859	334	89	96	99	99	100	--	--				BWCM

a Collected with the Texas sampler.

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment														Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters												
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000			
8-1945. NUECES RIVER NEAR TILDEN, TEX.--Continued																		
Apr. 18, 1950	0710		187	1,640	828	61	86	94	99	100	--	--						BWCM
May 12	1300		666	4,340	7,800	71	89	94	99	100	--	--						BWCM
May 13	1200		990	1,880	5,030	85	90	95	97	99	100	--						BWCM
May 15	1215		1,260	757	2,580	74	84	90	92	96	98	100						SBWCM
May 20	0655		512	2,120	2,930	78	87	91	96	99	99	100						SBWCM
Do.	1800		740	2,840	5,670	81	88	95	98	100	--	--						BWCM
May 23	1810		725	890	1,740	82	91	95	98	98	99	100						SBWCM
May 28	1930		1,100	962	2,860	86	89	92	95	97	97	100						SBWCM
July 21	1845		334	1,830	1,650	85	89	91	93	98	100	--						BWCM
Sept. 26	0630		250	3,230	2,180	--	82	84	99	100	--	--						BWCM
8-2100. NUECES RIVER NEAR THREE RIVERS, TEX.																		
Mar. 30, 1951	1500		154	2,040	848	--	99	100	--	--	--	--	--					SPWCM
May 5	1430		152	1,460	599	84	90	95	99	100	--	--	--					BWCM
May 7	2200		645	2,840	4,950	71	86	92	98	99	100	--	--					BWCM
Do.	1900		1,440	10,300	40,000	--	76	85	93	97	99	100	--					SBWCM
May 13	0830		364	2,660	2,610	65	81	89	96	100	--	--	--					BWCM
May 16	1900		2,170	3,520	20,600	--	89	94	97	98	100	--	--					SPWCM
May 21	1330		2,770	1,890	14,100	71	79	82	91	97	100	--	--					BWCM
May 25	0830		5,810	2,610	40,900	--	86	95	98	100	--	--	--					SPWCM
Do.	1900		6,500	1,640	28,800	82	89	91	95	96	97	99	100					SPWCM
June 3	0730		965	1,310	3,410	--	80	88	95	99	99	100	--					SPWCM
June 4	1900		11,000	1,660	49,300	--	92	97	97	99	100	--	--					SPWCM
June 16	0800		645	2,160	3,760	80	93	97	99	100	--	--	--					BWCM
Sept. 14	0800		11,700	2,420	76,400	73	83	90	96	99	100	--	--					BWCM
Sept. 15	1300		18,800	836	42,400	62	84	90	92	96	97	98	100					SBWCM
Sept. 24	0730		2,000	3,420	18,500	77	86	94	98	99	100	--	--					BWCM
Sept. 28	0730		2,530	1,700	11,600	82	89	93	98	99	100	--	--					BWCM
Oct. 23	1730		336	3,500	3,180	--	83	87	95	99	100	--	--					SPWCM
Nov. 3	1030		197	1,220	649	84	94	96	99	100	--	--	--					BWCM
Feb. 23, 1952	0900		2,030	2,880	15,800	--	85	91	94	95	99	100	--					SPWCM
Do.	1630		1,730	2,600	12,100	75	81	88	93	98	99	100	--					SPWCM
Feb. 24	0930		785	1,830	3,880	--	91	95	96	99	100	--	--					SPWCM
Feb. 25	0900		460	1,780	2,210	86	92	96	100	--	--	--	--					BWCM
Feb. 27	0900		585	2,290	3,620	85	96	97	99	100	--	--	--					BWCM
Apr. 2	0830		965	3,790	9,870	--	91	93	96	96	100	--	--					SPWCM
Do.	1415		825	3,080	6,860	70	87	94	97	98	99	100	--					SPWCM

Table 3. Particle-size analyses of suspended-sediment samples for Texas streams--Continued

[Methods of analysis: S, sieve; P, pipette; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; B, bottom-withdrawal tube]

Date of collection	Time	Water temperature (°F)	Discharge (cfs)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
8-2100. NUECES RIVER NEAR THREE RIVERS, TEX.--Continued																
Apr. 23, 1952-----	0700		585	8,100	12,800	--	81	91	96	99	100	--	--			SPWCM
Do.-------------	1600		2,350	4,770	30,300	--	84	92	96	99	99	100	--			SPWCM
Apr. 25-----------	0730		488	1,340	1,770	96	97	98	99	100	--	--	--			BWCM
May 27------------	0730		402	3,070	3,330	--	94	97	99	99	100	--	--			SPWCM
May 28------------	0900		3,100	4,840	40,500	71	81	90	97	99	100	--	--			SPWCM
May 29------------	0800		5,370	2,030	29,400	--	92	97	98	99	99	100	--			SPWCM
July 19-----------	1600		1,260	2,020	6,870	--	91	96	97	99	100	--	--			SPWCM
Sept. 11----------	0900		1,890	1,960	10,000	69	78	82	88	92	98	100	--			SPWCM
Sept. 12----------	2260		2,260	1,260	7,690	76	87	90	93	95	97	100	--			SPWCM

SPECIFIC WEIGHT OF FLUVIAL SEDIMENT DEPOSITS IN TEXAS

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SPECIFIC WEIGHT OF FLUVIAL SEDIMENT DEPOSITS IN TEXAS

INTRODUCTION

In order for the rate of reservoir depletion by sediment deposition to be calculated, the amount, location, and specific weight of the deposited sediment must be known. The amount of sediment can be measured at inflow stations. The location of the sediment deposit in the reservoir will depend on the type and particle size of the sediment and on the velocity gradient in the reservoir. The specific weight of deposited sediment will depend on the particle-size distribution of the sediment deposit and on the rate of compaction.

COMPUTATION OF SPECIFIC WEIGHT

The specific weight of a deposit that might be formed from suspended sediment can be computed from the median particle size of the sediment (Hembree and others, 1952). Figure 1 and Table 1, which are based on sediment data collected from the Colorado River near San Saba, Texas, illustrate this method of computing specific weight. Approximately 50 sediment samples, collected over a period of 11 years at discharges ranging from 440 to 68,000 cfs (cubic feet per second), were analyzed for particle-size distribution, and the median size for each sample was then plotted against the instantaneous sediment discharge. These particle-size analyses for the Colorado River near San Saba, Texas, and other particle-size analyses used in the computation of the specific weight of sediment for other stations are listed in Appendix B of the companion report in this volume, "Comparative Results of Sediment Sampling with the Texas Sampler and the Depth-Integrating Samplers". For predetermined class intervals (in tons per day) of suspended-sediment discharge, the corresponding median particle sizes were taken from the curve of Figure 1 and were listed in Table 1. Figure 2 shows a relation between the median particle size and the specific weight of relatively uncompacted sediment deposits in reservoirs in various parts of the United States (Hembree and others, 1952, p. 39; U.S. Geological Survey, 1954, p. 68-83, 109-119).

The specific weight of a deposit that might be formed from the suspended sediment of the Colorado River near San Saba was computed to be about 35 lb per cu ft (pounds per cubic foot) (Table 1).

Another method of computing the specific weight of a sediment deposit is by a formula derived by Lane and Koelzer (1943) in which the particle-size distribution by volume, compaction time, and the exposure of deposits to drying are used. The equation by Lane and Koelzer was modified by Wark and others (1961)

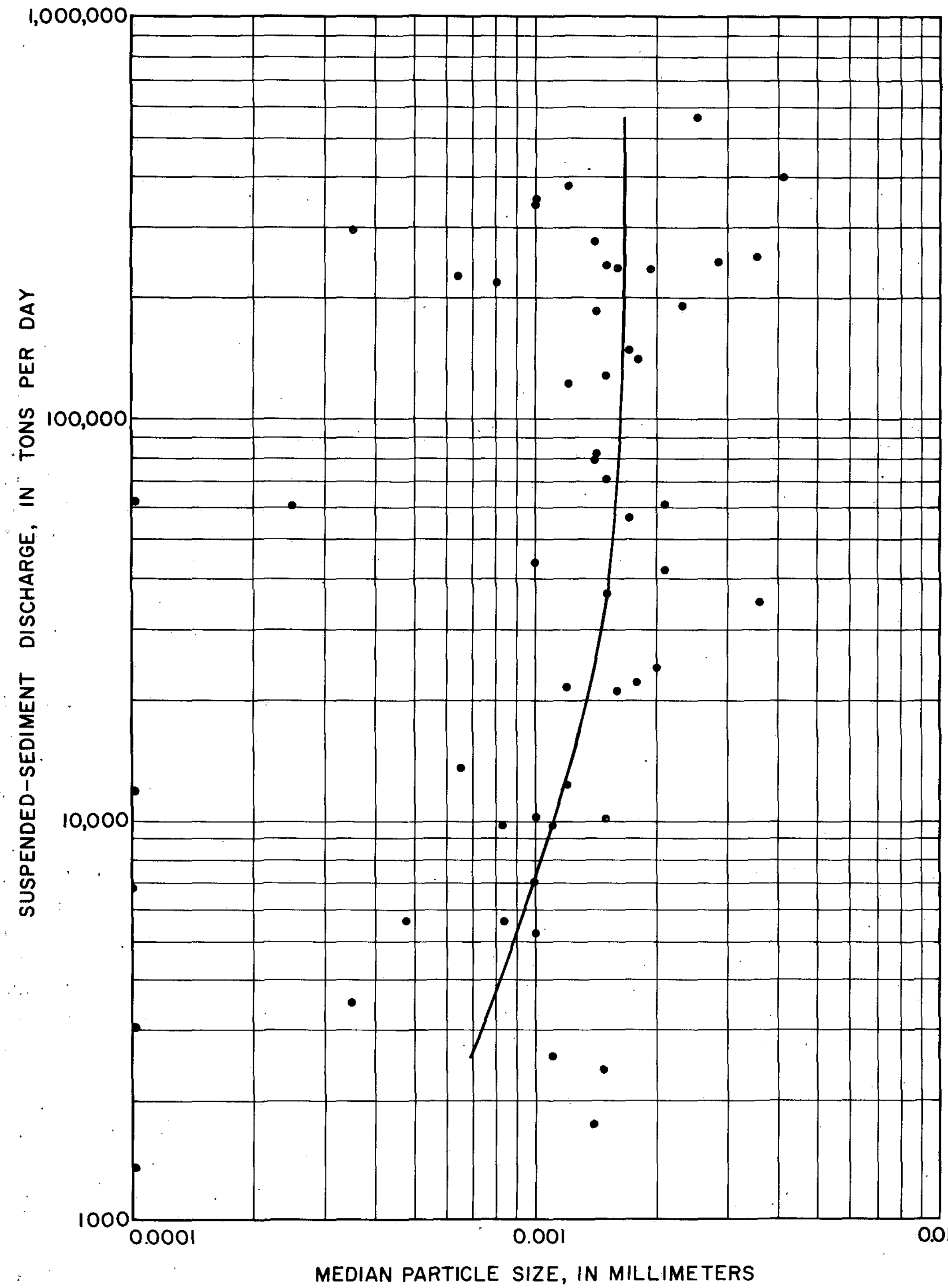

Figure 1

Median Particle Size Versus Suspended-Sediment Discharge, Colorado River near San Saba, Tex., Water Years 1951-61

U. S. Geological Survey in cooperation with the Texas Water Development Board

to express the particle-size distribution by weight rather than volume. The equation for the initial specific weight becomes:

$$\text{Initial specific weight} = \frac{100}{\frac{\%\ \text{clay}}{30} + \frac{\%\ \text{silt}}{65} + \frac{\%\ \text{sand}}{93}} .$$

For the Colorado River near San Saba the percentages of sand, silt, and clay are 1, 26, and 73, respectively. Using the above formula,

$$\text{Initial specific weight} = \frac{100}{\frac{73}{30} + \frac{26}{65} + \frac{1}{93}} = 35 \text{ lb per cu ft.}$$

Table 1.--Specific weight of fluvial sediment based on median particle size for Colorado River near San Saba, Tex.

Suspended-sediment discharge			Median particle size (mm)	Specific weight (lb/cu ft)	Total tons divided by specific weight
Class interval (tons per day)	Middle of class interval (tons per day)	Total tons			
0- 8,000	4,000	39,700	0.00088	27	1,470
8,000- 32,000	20,000	153,800	.00145	32	4,810
32,000- 64,000	48,000	400,900	.00155	34	11,800
64,000-128,000	96,000	353,900	.00160	35	10,100
128,000-256,000	192,000	2,407,000	.00165	35	68,800
256,000-512,000	384,000	2,659,000	.00168	35	76,000
Total		6,014,300			172,980

$$\frac{6{,}014{,}300}{172{,}980} = 34.8 \text{ lb per cu ft.}$$

Computation of the depletion rate of a reservoir by sediment deposition requires knowledge of how the initial specific weight of a sediment deposit will be affected by time and of the method of reservoir operation. Using the data for the Colorado River near San Saba, a compaction period of 50 years, and compaction coefficients from Lane and Koelzer (1943, p. 49) for a reservoir with a moderate drawdown, the specific weight of a sediment deposit after 50 years of compaction is as follows:

$$W_{50} = \frac{100}{\frac{\%\ \text{clay}}{46 + K \log T} + \frac{\%\ \text{silt}}{74 + K \log T} + \frac{\%\ \text{sand}}{93}}$$

$$= \frac{100}{\frac{73}{46 + 10.7\ (1.699)} + \frac{26}{74 + 2.7\ (1.699)} + \frac{1}{93}}$$

$$= 68 \text{ lb per cu ft,}$$

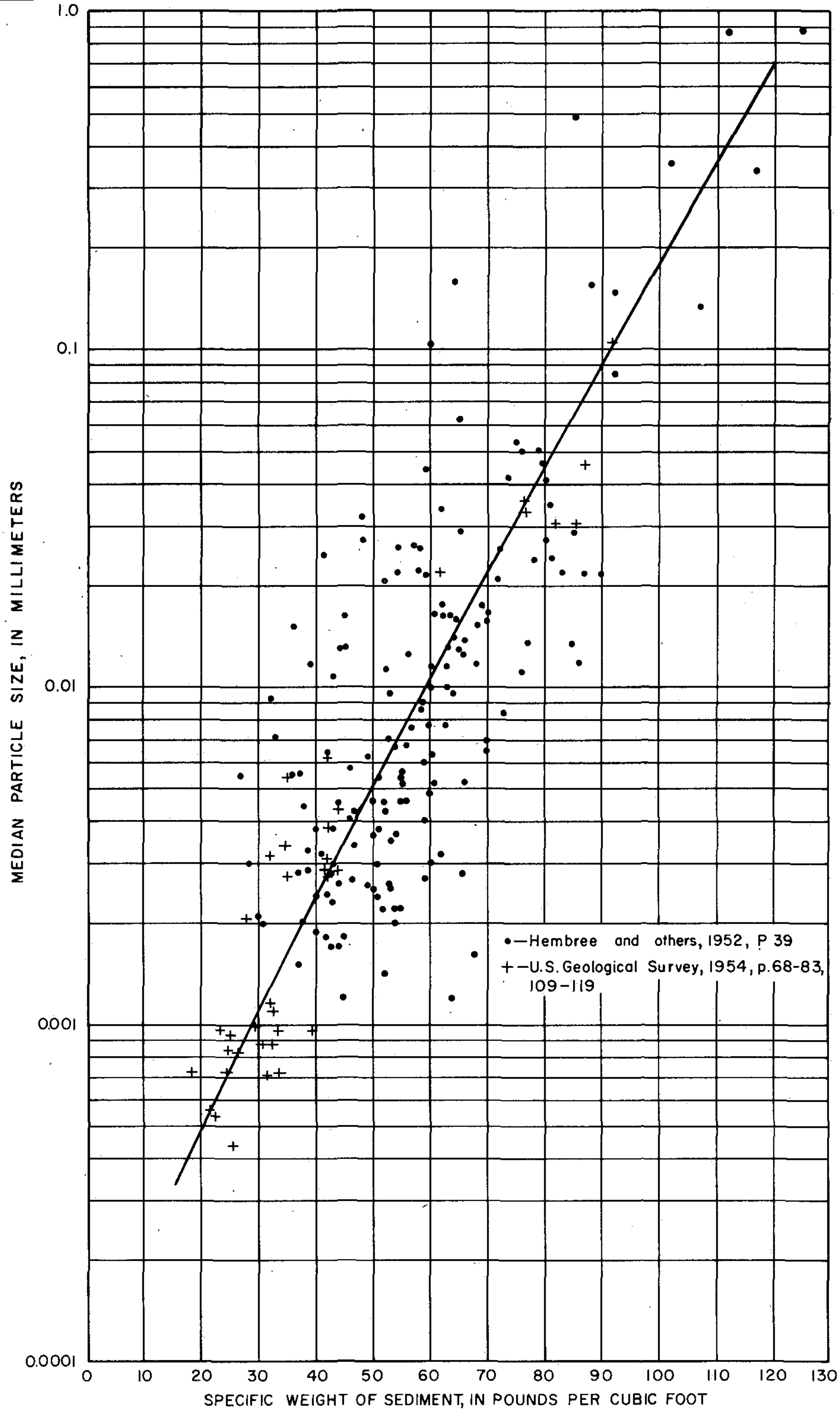

Figure 2

Relation of Specific Weight of Sediments Deposited in Reservoirs in Various Parts of the United States to Median Particle Size

U. S. Geological Survey in cooperation with the Texas Water Development Board

in which

W_{50} is specific weight after 50 years of compaction,
K is coefficient of compaction,
T is time in years.

Table 2 lists the computed specific weight of deposited sediment for stations in Texas where sediment data suitable for computation of specific weight have been collected. The specific weight was computed by the median particle-size method for stations for which a large number of particle-size distributions have been analyzed. For stations for which only a few particle-size distributions have been analyzed the specific weight was computed by the formula by Lane and Koelzer (1943, p. 50) and modified by Wark and others (1961). The computations show initial specific weights ranging from 32 lb per cu ft for the Nueces River near Tilden to 57 lb per cu ft for the Double Mountain Fork Brazos River near Aspermont. After 100 years of compaction the deposited sediment from the same stations would have specific weights of 68 lb per cu ft for the Nueces River near Tilden and 72 lb per cu ft for the Double Mountain Fork Brazos River near Aspermont.

Table 2.--Computed specific weight of deposited sediment

Station	Water years	Number of particle-size analyses	Initial specific weight (lb/cu ft)	Specific weight after compaction in reservoir with moderate drawdown	
				50 years	100 years
Prairie Dog Town Fork Red River near Brice	1950-51	36	47	74	76
Mulberry Creek near Brice	1950-51	22	53	71	74
*Sabine River near Bon Wier	1957-62	15	56	81	81
Elm Fork Trinity River near Muenster	1957-62	24	51	73	75
Pin Oak Creek near Hubbard	1956-60	63	35	68	70
*Trinity River near Romayor	1958-62	15	45	75	76
Double Mountain Fork Brazos River near Aspermont	1950-51	55	57	69	72
Clear Fork Brazos River near Fort Griffin	1950-51	38	34	67	70
*Brazos River near South Bend	1962	6	41	72	74
*Leon River at Gatesville	1961-62	4	35	68	71
*Brazos River at Richmond	1957-63	12	43	73	75
Colorado River at Robert Lee	1950-51	48	41	70	72
Colorado River near San Saba	1951-62	52	35	68	70
Colorado River at Columbus	1957-61	62	39	71	74
*Lavaca River near Edna	1961	2	35	68	71
*Guadalupe River at Victoria	1958-61	4	35	68	71
*San Antonio River near Fall City	1958-59	11	35	68	70
*San Antonio River at Goliad	1958-62	12	33	66	69
Nueces River near Tilden	1950	16	32	66	68
Nueces River near Three Rivers	1951-52	33	33	66	69

* Accuracy of specific weight limited by number of particle-size analyses.

REFERENCES

Hembree, C. H., Colby, B. R., Swenson, H. A., and Davis, J. K., 1952, Sedimentation and chemical quality of water in the Powder River drainage basin, Wyoming and Montana: U.S. Geol. Survey Circ. 170, 92 p.

Lane, E. W., and Koelzer, V. A., 1943, Density of sediments deposited in reservoirs: U.S. Inter-Agency Rept. 9, St. Paul, Minn., U.S. Dept. Army, 60 p.

U.S. Geological Survey, 1954, Supplemental base data for Lake Mead comprehensive survey of 1948-49, 121 p.

Wark, J. W., Keller, F. J., and Feltz, H. R., 1961, Reconnaissance of sedimentation and chemical quality of surface water in the Potomac River basin, _in_ Comprehensive survey of the water resources of the Potomac River basin: Baltimore, Md., U.S. Dept. Army, Appendix H, 75 p.