TEXAS WATER COMMISSION

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BULLETIN 6215

# CHEMICAL COMPOSITION OF TEXAS SURFACE WATERS, 1960



By

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Prepared in cooperation with the
U. S. Geological Survey
and Others

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## FOREWORD

It is requested that the reader note that the river basin designations appearing on the various charts and tables appearing in this publication represent the nomenclature of the U. S. Geological Survey, which in some instances differs from Texas Water Commission nomenclature. River basin designations of the Texas Water Commission are shown on Plate 1.

The differences in the designations as included herein are shown below:

| Texas Water Commission | U. S. Geological Survey |
|---|---|
| Canadian River Basin | Arkansas River Basin |
| Sulphur River Basin | (Part of the) Red River Basin |
| Brazos-Colorado Coastal Area | San Bernard River Basin |
| San Antonio River Basin | (Part of the) Guadalupe River Basin |
| (Part of the) San Antonio-Nueces Coastal Area | Mission River Basin |
| (Part of the) San Antonio-Nueces Coastal Area | Aransas River Basin |

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# CHEMICAL COMPOSITION OF TEXAS SURFACE WATERS, 1960

## INTRODUCTION

This report contains data on the chemical quality of the surface waters of Texas in the water year 1960. Results are presented for chemical analyses of water samples obtained daily from selected points throughout the State and also the results for other samples obtained at various points during the period October 1, 1959, to September 30, 1960.

All natural water contains dissolved mineral matter. Water in contact with rocks and soils, even for only short periods of time, will dissolve some of the mineral and organic substances. The chemical character of stream waters is dependent on several factors, such as type of soil and rock with which the water is in contact, length of time of the contact, climatic conditions, and activities of man. In Texas, the chemical composition of waters varies widely from stream to stream and, often, from point to point on a particular stream.

The records of chemical analysis of surface waters in the report serve as a basis for determining the suitability of the waters for industrial, agricultural, and domestic uses insofar as such use is affected by the dissolved mineral matter in the waters.

## COOPERATION

This is the fifteenth in a series of annual reports covering surface waters of Texas prepared by the U. S. Geological Survey in cooperation with the Texas Water Commission (formerly the Texas Board of Water Engineers). In addition too tthe annual reports, a compilation was issued providing data for the period 1938 to 1945. These reports may be obtained by writing to the Reports Division, Texas Water Commission, Austin, Texas.

Other agencies cooperating in the collection of these data were the Brazos River Authority, the Canadian River Municipal Water Authority, the Chambers-Liberty Counties Navigation District, the cities of Dallas, Fort Worth, and Wichita Falls, the Colorado River Municipal Water District, the Greenbelt Municipal and Industrial Water Association, the Lower Colorado River Authority, the Lower Neches Valley Authority, the Red Bluff Water Power Control District, the Sabine River Authority, the Tarrant County Water Control and Improvement District No. 1, the Texas Electric Service Company, the U. S. Corps of Engineers, the West Central Texas Municipal Water District, and the Wichita County Water Control and Improvement Districts.

Analyses for the Red River near Gainesville were made by the Oklahoma City office of the U. S. Geological Survey, in cooperation with the Oklahoma Water Resources Board.

Records for 10 stations in the Rio Grande basin have been furnished by the U. S. Department of Agriculture, in cooperation with the International Boundary and Water Commission.

## COLLECTION AND ANALYSIS OF SAMPLES

The samples for which data are given were collected from October 1, 1959, to September 30, 1960. Descriptive statements are given for each sampling station for which a regular series of chemical analyses have been made. These statements give location of the stream sampling station, drainage area of the stream above the station, length of time for which records are available, extremes of dissolved solids, hardness, specific conductance, and water temperature, and other pertinent data. Records of discharge of the stream at or near the sampling point for the sampling period are included in most tables of analyses.

### Texas Water Commission-U. S. Geological Survey Sampling Program

During the period covered by this report samples were collected daily at 41 points on Texas streams and twice weekly at four sampling points in Trinity Bay near the mouth of the Trinity River. Samples were collected twice monthly at five points in a small area on Salt Croton and Haystack Creeks near Aspermont. In addition to the data on chemical quality included in this report, temperature data for streams at 32 of the sampling stations and sediment data for one of the sampling stations are available in the files of the U. S. Geological Survey, Austin, Texas. Records of chemical quality of streams at 53 additional sampling points for varying lengths of time have been published in previous reports of this series. The locations of the active and inactive stations are shown on the accompanying map, Plate 1, and the periods of operation of all the stations are shown on the bar graph (Figure 3). The five sampling points on Salt Croton and Haystack Creeks are indicated as a single location (43) on the map.

Water samples were usually obtained daily at or near a Geological Survey stream-gaging station. Specific conductance was determined on all samples. Composite samples were usually made for 10-day periods by using equal volumes of successive samples having similar conductances. For some streams that are subject to sudden and large changes in chemical composition or concentration, samples were composited for shorter periods on the basis of the concentration of the daily samples. At several sampling stations where changes in chemical composition occur gradually, daily samples for an entire month were composited.

### International Boundary and Water Commission-U. S. Department of Agriculture Sampling Program

This report includes chemical quality records for 10 stations in the Rio Grande basin where samples were collected by the International Boundary and Water Commission and analyses made by the U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, California. At 3 of the stations, samples were collected daily; at the others, from 2 to 31 samples were collected each month. A single monthly composite sample was made for analysis by taking from each individual sample an amount of water proportional to the volume of river flow represented by the sample. Results of these analyses are also published in equivalents per million in Water Bulletin Number 30 of the International Boundary and Water Commission, together with streamflow and related data.

## EXPRESSION OF RESULTS

The chemical constituents given in the tables of analyses are reported in parts per million. A part per million is a unit weight of a constituent in a million unit weights of water. Values for other characteristics are given in appropriate units.

Mena discharge is reported in cfs (cubic feet per second). A cubic foot per second is the rate of discharge of a stream whose channel is 1 square foot in cross-sectional area and whose average velocity is 1 foot per second.

Dissolved solids are reported in tons per day, tons per acre-foot, and parts per million. Values reported for dissolved solids less than 1,000 ppm (parts per million) are residues on evaporation and for more than 1,000 ppm are sums of determined constituents unless noted otherwise. In obtaining the sum, the bicarbonate is calculated as carbonate by dividing by 2.03.

For those analyses in which a calculated value as sodium is shown for sodium and potassium, this value, in equivalents per million, was used in computing the percent sodium and sodium-adsorption ratio. For those analyses in which a determined value for sodium is reported separately, this value is used in computing the percent sodium and sodium-adsorption ratio.

Sodium-adsorption ratio (SAR) is used to express the relative activity of sodium ions in exchange reactions with the soil.

$$SAR = \frac{Na+}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}},$$

where the concentrations of the constituents are expressed in equivalents per million. Waters are divided into four classes with respect to sodium hazard depending upon the SAR value and the specific conductance. At a conductance of 100 micromhos per centimeter the dividing points are at SAR values of 10, 18, and 26, but at 5,000 micromhos the corresponding dividing points are at SAR values of approximately 2.5, 6.5, and 11.

Specific conductance, a measure of a water's ability to conduct an electric current, is reported in micromhos per centimeter at 25°C.

A water having a pH of 7.0 is considered to be neutral; less than 7.0 increasingly acidic; and greater than 7.0 increasingly alkaline.

Sodium and potassium are reported as sodium unless listed separately in the tables.

Hardness due to calcium and magnesium and noncarbonate hardness are reported as calcium carbonate ($CaCO_3$).

The weighted averages of analyses are reported for daily sampling stations for which discharge records are available. The weighted-average analysis represents the approximate composition of water that would be found in a reservoir containing all the water passing a given station during the year, after thorough mixing in the reservoir.

The samples were analyzed according to methods used by the U. S. Geological Survey.1/

## SURFACE-WATER RUNOFF AND CHEMICAL-QUALITY CONDITIONS

Rainfall and surface-water runoff were deficient over much of Texas during the 1960 water year, but in the Arkansas River basin and the coastal areas drained by the lower Brazos, lower Colorado, and Guadalupe Rivers, runoff was excessive. Drought conditions were most severe in West Texas. Mean discharges for selected stations for the 1959 and 1960 water years, as well as for the period of record, are shown in Figure 1. On many streams changes in dissolved-solids concentration are closely related to the rate of discharge, and low flows are likely to be considerably more mineralized than are flood flows in the same stream. However, for streams whose discharge is controlled by reservoirs, the chemical composition of the water may remain relatively constant despite large fluctuations in discharge. Streams that are subject to pollution by oil fields or other sources of salts may show marked increases in dissolved solids at times when moderate storm runoff flushes oil-field wastes or salt residues from evaporation of water into the streams.

In Table 1 are listed the mean discharge and maximum, minimum and weighted-average concentrations of dissolved solids for the 1960 water year for those stations operated under the Texas Water Commission-U. S. Geological Survey sampling program.

### Arkansas River Basin

Rainfall in the Arkansas River basin in Texas was well above normal during the 1960 water year and runoff of the Canadian River near Amarillo was three times as great as the 1959 runoff and 120 percent of the 23-year average. Deficient rainfall was recorded in only two months during the water year, November and May, whereas rainfall during December and June was the greatest of record for those months. Also, from July 5 through July 8, the longest period of continuous rain in the history of Amarillo was recorded. Excessive runoff occurred in the Canadian River near Amarillo during 7 months of the year, ranging from 105 percent of the average for August to 641 percent of the average for December.

The increase in runoff was accompanied by a decrease in the weighted-average of dissolved-solids concentrations from 649 ppm in the 1959 water year to 548 ppm in 1960. During the 10 years of chemical-quality record, water of better quality was available only during the 1958 water year, when the weighted average of dissolved-solids concentrations was 527 ppm.

Extremely low flow is maintained by drainage of sewage effluent down East Amarillo Creek from the Amarillo sewage disposal plant, and analyses often show nitrate concentrations in excess of 50 ppm. During the 1960 water year, however, the weighted average of nitrate concentrations was 7.3 ppm.

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1/ Rainwater, F. H., and Thatcher, L. L., 1960, Methods of collection and analysis of water samples: U. S. Geological Survey Water-Supply Paper 1454.
American Public Health Association and others, 1955, Standard methods for the examination of water, sewage and industrial wastes.

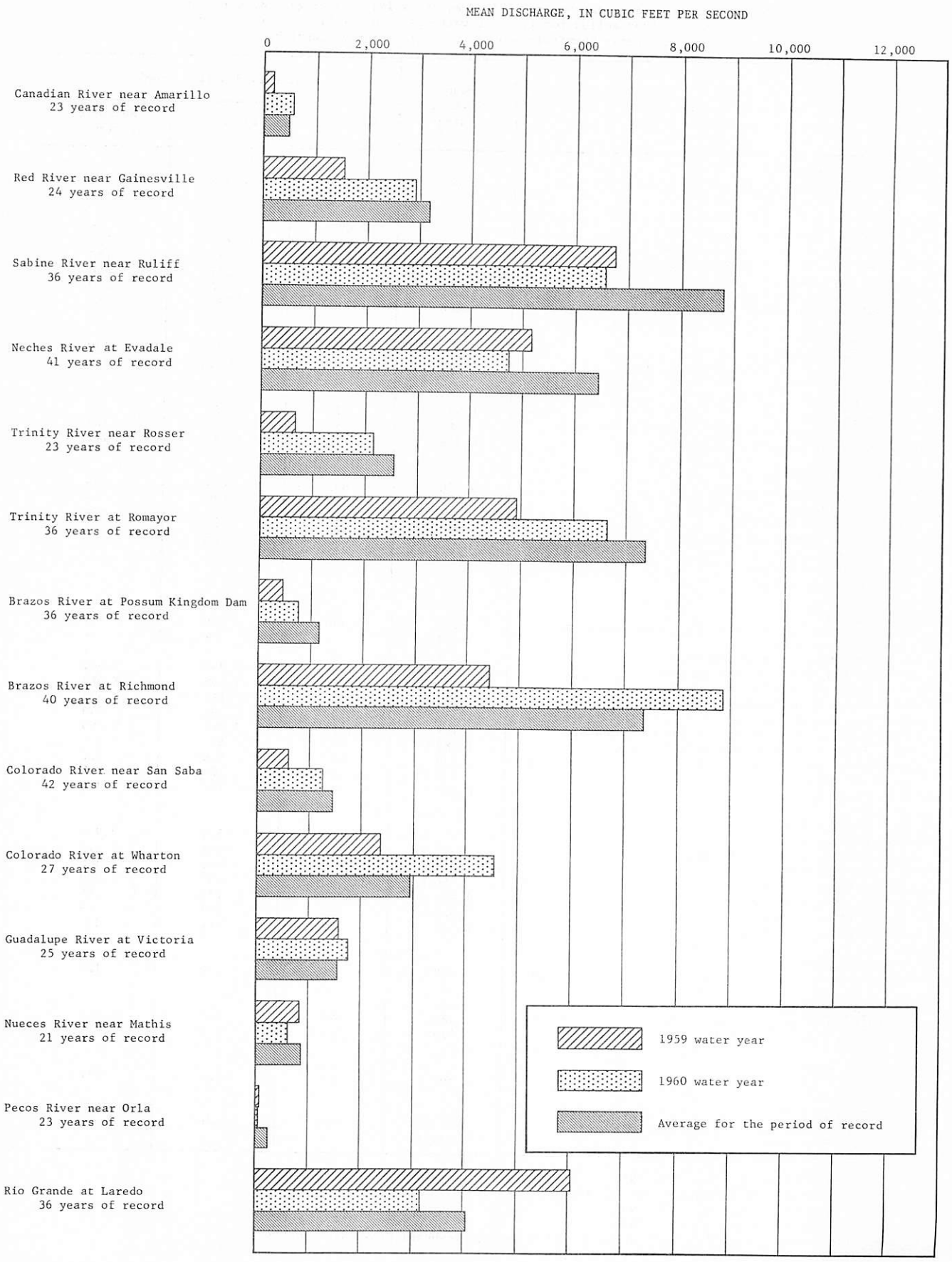



Figure 1.--Mean discharge at selected stations for the 1959 and 1960 water years and for the period of record

Table 1.--Mean discharge and maximum, minimum, and weighted-average concentrations of dissolved solids for the 1960 water year for stations operated under the Texas Water Commission - U. S. Geological Survey sampling program

| Sampling station | | Mean discharge (cfs) | Dissolved solids (ppm) | | |
|---|---|---|---|---|---|
| | | | Maximum | Minimum | Weighted average |
| ARKANSAS RIVER BASIN | | | | | |
| Canadian River near Amarillo | | 564 | 2,210 | 395 | 548 |
| RED RIVER BASIN | | | | | |
| Salt Fork Red River near Hedley | | -- | 1,090 | 270 | -- |
| Little Wichita River near Henrietta | | 62.7 | 4,120 | 110 | 270 |
| Little Wichita River near Ringgold | | 108 | 4,440 | 47 | 180 |
| Red River near Gainesville | | 2,916 | 4,760 | 217 | 1,660 |
| Red River at Denison Dam near Denison | | 5,203 | 1,160 | 900 | 1,020 |
| South Sulphur River near Cooper | | 339 | 1,120 | 85 | 143 |
| SABINE RIVER BASIN | | | | | |
| Sabine River near Tatum | | 2,527 | 513 | 96 | 170 |
| Sabine River near Ruliff | | 6,545 | 217 | 72 | 117 |
| NECHES RIVER BASIN | | | | | |
| Neches River near Alto | (a) | 1,194 | 198 | 90 | 122 |
| Angelina River near Lufkin | | 984 | 254 | 56 | 103 |
| Neches River at Evadale | | 4,728 | 172 | 72 | 112 |
| TRINITY RIVER BASIN | | | | | |
| Trinity River near Rosser | | 2,150 | 653 | 133 | 286 |
| Richland Creek near Fairfield | | -- | 6,500 | 178 | -- |
| Trinity River at Romayor | | 6,621 | 719 | 94 | 259 |
| Trinity River near Moss Bluff | | -- | 604 | 125 | -- |
| Old River near Cove | | -- | 822 | 145 | -- |
| Trinity River at Anahuac | | -- | -- | -- | -- |
| Trinity Bay near Anahuac | | -- | -- | -- | -- |
| BRAZOS RIVER BASIN | | | | | |
| Double Mountain Fork Brazos River near Aspermont | | 149 | 6,350 | 674 | 977 |
| Croton Creek near Jayton | | 12.3 | -- | -- | -- |
| Salt Croton Creek near Aspermont | | 4.02 | -- | -- | -- |
| Salt Fork Brazos River near Aspermont | | 80.2 | 83,900 | 1,240 | 5,660 |
| Brazos River at Seymour | | 279 | 14,000 | 1,260 | 2,510 |
| Hubbard Creek near Breckenridge | | 83.0 | 5,350 | 142 | 330 |
| Salt Creek near Newcastle | (b) | 36.4 | 1,700 | 82 | 140 |
| Brazos River at Possum Kingdom Dam near Graford | | 749 | 2,220 | 1,240 | 1,400 |
| Brazos River at Whitney Dam near Whitney | | 1,882 | 831 | 589 | 705 |
| Little River at Cameron | (c) | 2,139 | 607 | 130 | 311 |
| Navasota River near Bryan | | 532 | 1,130 | 100 | 248 |
| Brazos River at Richmond | | 8,869 | 694 | 155 | 331 |
| COLORADO RIVER BASIN | | | | | |
| Colorado River near Ira | | 2.47 | 67,600 | 592 | 3,930 |
| Colorado River at Colorado City | | 11.8 | 28,500 | 453 | 2,570 |
| Beals Creek near Westbrook | | 33.7 | 14,900 | 155 | 585 |
| Colorado River near Silver | | 50.8 | 11,100 | 253 | 1,000 |
| Colorado River near San Saba | | 1,252 | 1,300 | 136 | 316 |
| Colorado River at Austin | | 3,520 | 286 | 199 | 246 |
| Colorado River at Wharton | | 4,576 | 279 | 114 | 231 |
| LAVACA RIVER BASIN | | | | | |
| Navidad River near Ganado | (d) | 798 | 480 | 63 | 128 |
| GUADALUPE RIVER BASIN | | | | | |
| Guadalupe River at Victoria | | 1,764 | 404 | 167 | 288 |
| San Antonio River at Goliad | | 429 | 726 | 156 | 460 |
| NUECES RIVER BASIN | | | | | |
| Nueces River near Mathis | | 602 | 354 | 224 | 288 |
| RIO GRANDE BASIN | | | | | |
| Pecos River below Red Bluff Dam near Orla | | e62.1 | 12,600 | 6,480 | 7,710 |
| Pecos River near Girvin | | 24.5 | -- | -- | -- |

a Station operation began Oct. 27, 1959.
b Station operation discontinued Feb. 16, 1960.
c Station operation began Oct. 29, 1959.
d Station operation began Oct. 26, 1959.
e Discharge values adjusted to exclude inflow from Salt (Screwbean) Draw which enters Pecos River between sampling point and gaging station.

## Red River Basin

Streamflow in the Red River basin in Texas during the 1960 water year was generally deficient, although greater than in 1959. At the Gainesville station, just upstream from Lake Texoma, streamflow in the 1960 water year was almost twice that for the previous year, and about 90 percent of the 24-year average. The weighted average of dissolved-solids concentrations, however, increased slightly from 1,640 ppm in 1959 to 1,660 ppm in 1960. The average concentration was exceeded during 80 percent of the year.

At Denison Dam, just below Lake Texoma, discharge of the Red River for 1960 was almost equal to the 37-year average and more than twice that for the 1959 water year. The quality of the water released from Lake Texoma, although always better than that upstream, was only slightly better than for the previous year. The dissolved-solids concentrations ranged from 900 ppm to 1,160 ppm, with a weighted average of 1,020 ppm.

At the Cooper station, the South Sulphur River had water of good quality, with a weighted average of dissolved-solids concentrations of 143 ppm. Streamflow at this station was about 370 percent of that for the 1959 water year and 89 percent of the 18-year record.

## Sabine River Basin

The Sabine River basin drains an area of high rainfall in East Texas and Western Louisiana, and runoff was excessive for the first half of the 1960 water year. Thunderstorm activity caused moderate to locally heavy flooding of the upper Sabine River during December and January. By February, soil moisture had increased to the point that even moderate rains produced runoff, and the lower Sabine River was bank-full for the month, but no flooding occurred. In March, streamflow receded gradually and was about average or deficient for the rest of the water year.

The water of the basin is almost always low in dissolved solids, although often high in organic color and turbidity. At the Tatum station, where streamflow for 1960 was 150 percent of that for 1959, the weighted average of dissolved-solids concentrations was 170 ppm, somewhat better than the 188 ppm of 1959. At the downstream station near Ruliff, streamflow was slightly less than in 1959 and the weighted average of dissolved-solids concentrations increased from 109 ppm in 1959 to 117 ppm in 1960. A duration curve for the Sabine River near Ruliff shows the percentage of time during which specified concentrations of dissolved solids were equaled or exceeded during the 1960 water year. (See Figure 2.) The curve shows that 200 ppm dissolved solids was exceeded about 10 percent of the time.

## Neches River Basin

The Neches River also drains an area of high rainfall, and the rainfall and streamflow pattern for the 1960 water year was similar to that of the Sabine River. Heavy rains in mid-December produced sharp rises in the entire Neches River basin; flash flooding closed highways in the upper basin. Streamflow remained excessive through March and receded through the remainder of the water year.

A new sampling station on the Neches River near Alto was established in October, 1959. Dissolved-solids concentrations ranged from 90 ppm to 198 ppm,

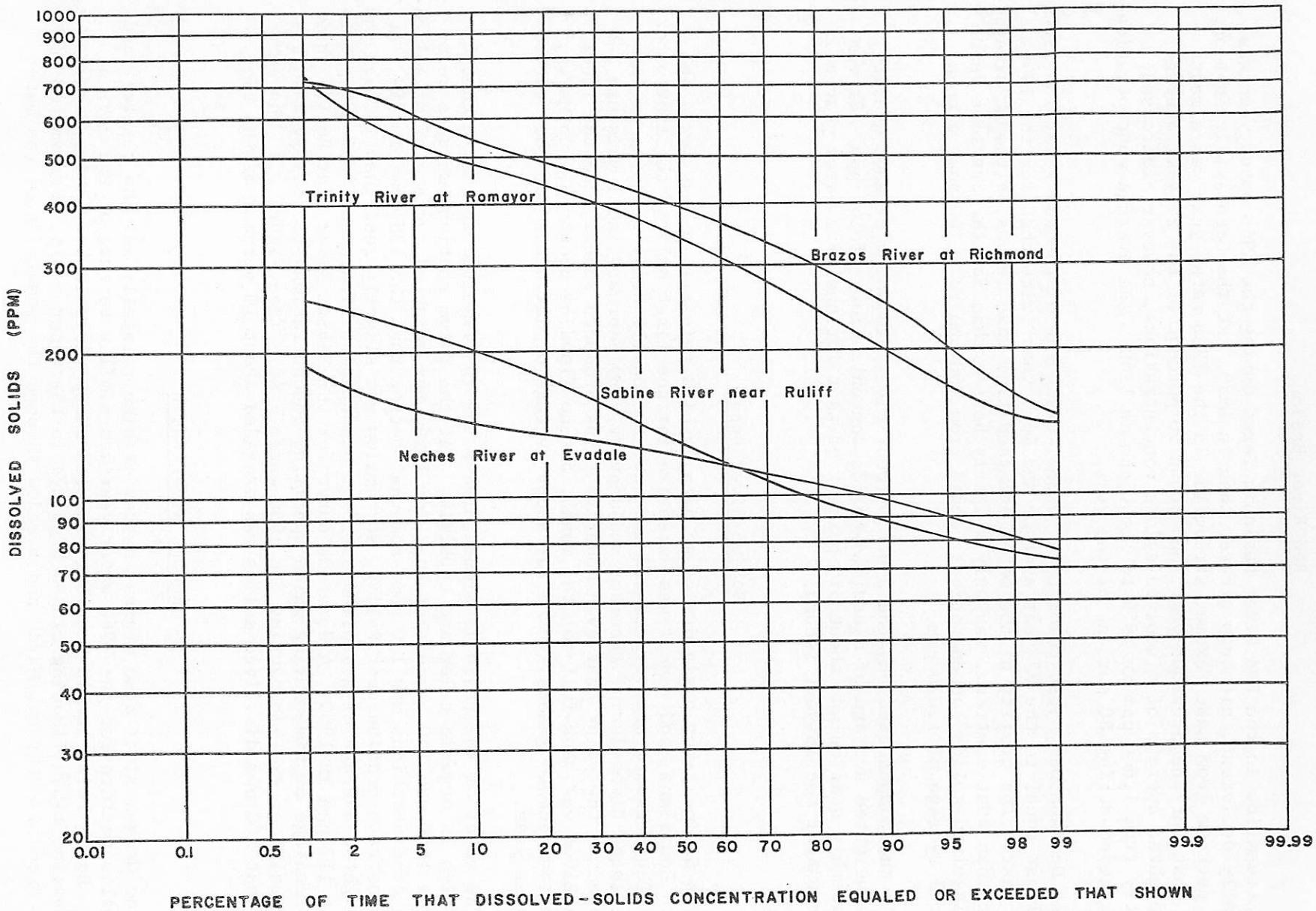



Figure 2.--Duration curves for dissolved solids for four selected stations, 1960 water year

with a weighted average of 122 ppm. The water in the Neches River basin is usually of good quality except where polluted by oil-field or other industrial wastes. Downstream, at the station on the Angelina River near Lufkin, streamflow was only 78 percent of the 32-year average. The weighted average of dissolved-solids concentrations was 103 ppm. At the station at Evadale, streamflow was less than that for the previous year and the weighted average of dissolved-solids concentrations increased from 89 ppm in 1959 to 112 ppm in 1960. The dissolved-solids concentrations ranged from a minimum of 72 ppm to a maximum of 172 ppm. A duration curve for the Neches River at Evadale is given in Figure 2 and shows the percentage of time during which specified concentrations of dissolved solids were equaled or exceeded during the 1960 water year.

## Trinity River Basin

Streamflow in the Trinity River basin in 1960, although greater than in 1959, was less than the long-term average. Normally, streamflow in the upper Trinity River basin is controlled by reservoirs located above Fort Worth and Dallas. Heavy rains in the area the first of October and the middle of December, along with subsequent floodwater releases from these reservoirs, kept streamflow in the basin well above normal for the first half of the 1960 water year. Streamflow in the last half of the year was generally below normal.

The cities of Fort Worth and Dallas divert considerable water for municipal supply, of which about 60 percent is returned as sewage effluent. Analyses of samples from the Trinity River near Rosser show the effects of this sewage effluent. Low-flow samples in past years have shown nitrate concentrations in excess of 100 ppm, but in the 1960 water year, nitrate concentrations ranged only from 4.0 ppm to 29 ppm, with a weighted average of 7.8 ppm. Dissolved-solids concentrations ranged from 133 ppm to 653 ppm and the weighted average was 286 ppm.

Average discharge at Romayor during the 1960 water year was 6,621 cfs, as compared with the 1959 average of 4,909 cfs and the 36-year average of 7,367 cfs. The minimum dissolved-solids concentration was 94 ppm, the maximum was 719 ppm, and the weighted average was 259 ppm. A duration curve for the station, showing the percentage of time during which specified concentrations of dissolved solids were equaled or exceeded during the 1960 water year, is given in Figure 2.

## Brazos River Basin

The Brazos River basin is one of contrasts. In the upper basin, rainfall is usually light, and minor tributaries, principally to the Salt Fork Brazos River, contribute water containing large concentrations of dissolved solids. In the lower basin, rainfall is heavier and flood flows may be very low in dissolved solids. In the 1960 water year, streamflow was deficient at all stations above Possum Kingdom Reservoir, and excessive at all stations in the lower basin.

At the station on the Double Mountain Fork Brazos River near Aspermont, streamflow for the 1960 water year was only 84 percent of the 31-year average, and more than 60 percent of the year's total occurred in a 4-day period in July. Dissolved-solids concentrations exceeded the weighted average of 977 ppm for 351 days of the water year, but the flow was great enough and quality of the water good enough on the 15 remaining days to bring about this lower weighted average. At the Salt Fork Brazos River station near Aspermont, streamflow was only 53 percent of the long-term average and the weighted average of dissolved-solids concentrations was 5,660 ppm, as compared with 5,020 ppm in the 1959 water year.

Below the junction of the Double Mountain and Salt Forks, at the station on the Brazos River at Seymour the weighted average of dissolved-solids concentrations was 2,510 ppm; and at the station on Hubbard Creek near Breckenridge the weighted average was 330 ppm. Inflow to Possum Kingdom Reservoir was below normal for the year, and the dissolved-solids concentrations of the water released from the reservoir exceeded 1,000 ppm for the entire year, ranging from 1,240 ppm to 2,220 ppm. The weighted average was 1,400 ppm.

Water stored in Whitney Reservoir is generally of better quality than that stored in Possum Kingdom Reservoir because the intervening drainage area does not have sources of highly saline water as does the Brazos River above Possum Kingdom Reservoir. During 1960 above-normal runoff occurred between the two reservoirs due to heavy local rains. Dissolved-solids concentrations of water released from Whitney Reservoir ranged from a minimum of 589 ppm to a maximum of 831 ppm. The weighted average decreased from 893 ppm in 1959 to 705 ppm in 1960.

A new sampling station on the Little River at Cameron was placed in operation in October, 1959. Dissolved-solids concentrations for the station ranged from 130 ppm to 607 ppm.

Water discharge of the Brazos River at Richmond for the 1960 water year was above average for the 40-year period of record and about twice the 1959 average. Flood flows occurred in several months during the year; the peak discharge of 60,300 cfs occurred on October 9. The weighted average of dissolved-solids concentrations was 331 ppm. A duration curve for the station, showing the percentage of time during which specified concentrations of dissolved solids were equaled or exceeded during the 1960 water year, is given in Figure 2.

## Colorado River Basin

Streamflow for the 1960 water year was deficient in the upper Colorado River basin and excessive in the lower basin. At the two upstream sampling stations on the Colorado River near Ira and at Colorado City, the water is saline much of the time due to inflow from salt-spring areas and from oil-field wastes, but flood flows may be of good quality. At both stations, over half the total flow occurred on the 4 days, July 5-8, with the year's minimum dissolved-solids concentrations occurring on these days. Near Ira, the weighted average of dissolved-solids concentrations was 3,930 ppm, a figure which was exceeded about 95 percent of the year; at Colorado City, the weighted average was 2,570 ppm which was also exceeded about 95 percent of the year.

Beals Creek is less mineralized than the Colorado River upstream, and at the Westbrook station the dissolved-solids concentrations ranged from 155 ppm to 14,900 ppm with a weighted average of 585 ppm. Downstream from Beals Creek, on the Colorado River near Silver, streamflow for the 1960 water year was almost 50 percent greater than for 1959, and the weighted average of dissolved-solids concentrations decreased from 1,270 ppm in 1959 to 1,000 ppm in 1960.

The station on the Colorado River near San Saba measures inflow to Lake Buchanan, uppermost of six Highland Lakes. During 13 years of chemical-quality records, the weighted averages of dissolved-solids concentrations have ranged from 184 ppm to 380 ppm. For 1960, the weighted average was 316 ppm.

The station at Austin measures the chemical quality of water that has been thoroughly mixed by passage through the six Highland Lakes, and only gradual changes in composition occur. Although water discharge during the 1960 water year

was more than twice that for the previous year and 139 percent of the 62-year average, the weighted average of dissolved-solids concentrations was 246 ppm, only slightly better than the 249 ppm of 1959.

Streamflow below Austin is largely maintained by releases from the Highland Lakes and because inflow from tributary streams is of about the same quality as that released from the lakes, there is little significant change in the chemical composition of the lower Colorado River. At Wharton, the dissolved-solids concentrations ranged from a minimum of 114 ppm to a maximum of 279 ppm, with a weighted average of 231 ppm.

## Lavaca River Basin

A new sampling station, Navidad River near Ganado, was placed in operation in October 1959 to provide information on the quality of water available for storage in a proposed reservoir near Ganado. Streamflow for the 1960 water year was 174 percent of the 21-year period of streamflow record. This was largely due to a tropical disturbance which began on June 24 and caused flooding in the entire coastal area from Corpus Christi to Houston. Dissolved-solids concentrations ranged from a minimum of 63 ppm to a maximum of 480 ppm, with a weighted average of 128 ppm.

## Guadalupe River Basin

The Guadalupe River heads in the Edwards Plateau and flows southeasterly across the Balcones fault zone. A relatively high base flow is maintained by natural springs in the drainage area. Streamflow of the Guadalupe River at Victoria for the 1960 water year was excessive, mainly due to heavy local rains in October and August and the tropical storm, beginning on June 24, which caused serious local flooding in all coastal counties from Harris to Refugio. The weighted average of dissolved-solids concentrations decreased from 303 ppm in 1959 to 288 ppm in 1960.

The effects of the June storm on the San Antonio River were not as pronounced and streamflow for the station at Goliad was only 82 percent of the 25-year average. Dissolved-solids concentrations ranged from a minimum of 156 ppm to a maximum of 726 ppm. The weighted average was 460 ppm.

## Nueces River Basin

The sampling station, Nueces River near Mathis, measures the quality of the water released from Lake Corpus Christi. Storage in the reservoir was above spillway level at the end of October 1959 but steadily decreased during the next 8 months until in May 1960 there was only 90 percent of capacity. Summer rains caused the lake to spill for the months of June, July, and August. At the end of the water year, storage was at 182,600 acre-feet, or 98 percent of capacity.

Past records indicate that considerable variation in chemical quality occurs at upstream points in the Nueces basin, but mixing of flood flows in the lake results in water that is always of good quality. The weighted averages for the thirteen years of chemical-quality record have ranged from 208 ppm to 343 ppm. The weighted average for the 1960 water year was 288 ppm.

## Rio Grande Basin

Rainfall and streamflow in the Rio Grande basin were deficient during the 1960 water year. Discharge of the Pecos River below Red Bluff Dam near Orla was only about 29 percent of the 23-year average. Storage in Red Bluff Reservoir, however, increased from 63,150 acre-feet to 85,400 acre-feet, although the stored water was more saline than during 1959. The minimum dissolved-solids concentration for the 1960 water year was greater than the maximum concentration for 1959. The weighted average was 7,710 ppm.

Dissolved-solids concentrations were generally higher at all stations in the lower Rio Grande basin. The range in dissolved-solids concentrations of the outflow from Falcon Reservoir was from 347 ppm to 510 ppm in the 1959 water year and from 503 ppm to 596 ppm in the 1960 water year.

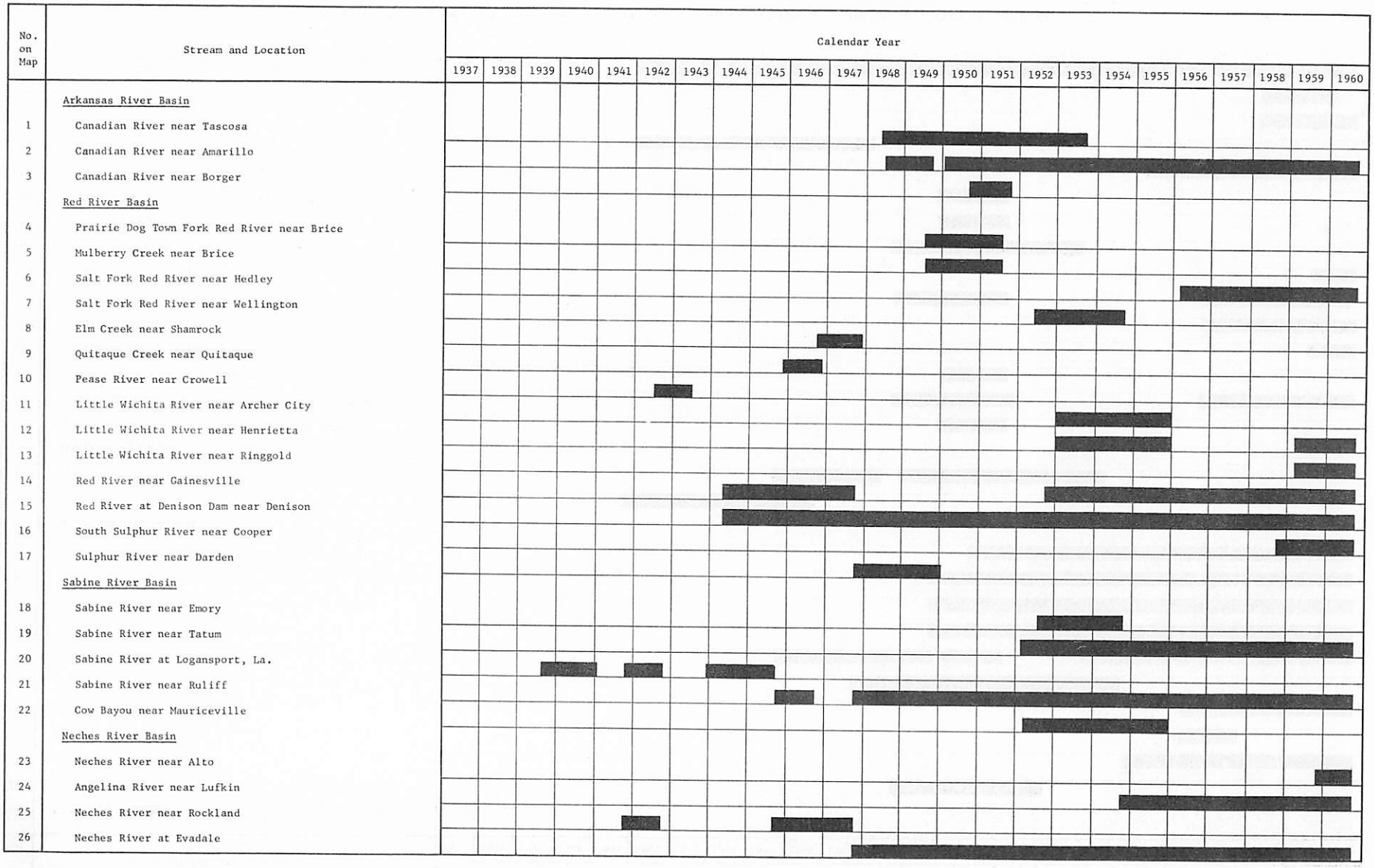



Figure 3.— Periods of operation of quality-of-water sampling stations in Texas

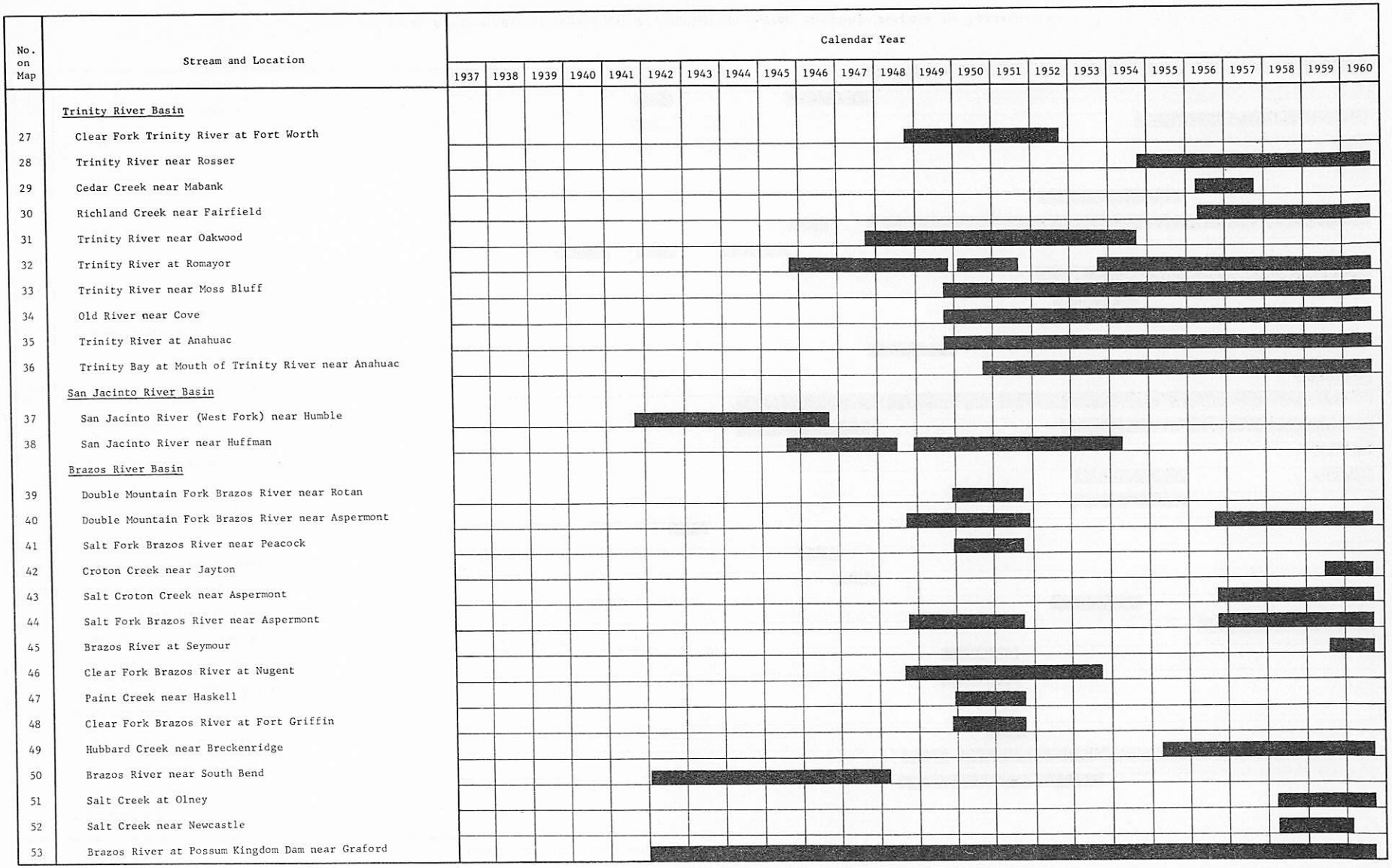



Figure 3.—Periods of operation of quality-of-water sampling stations in Texas--Continued

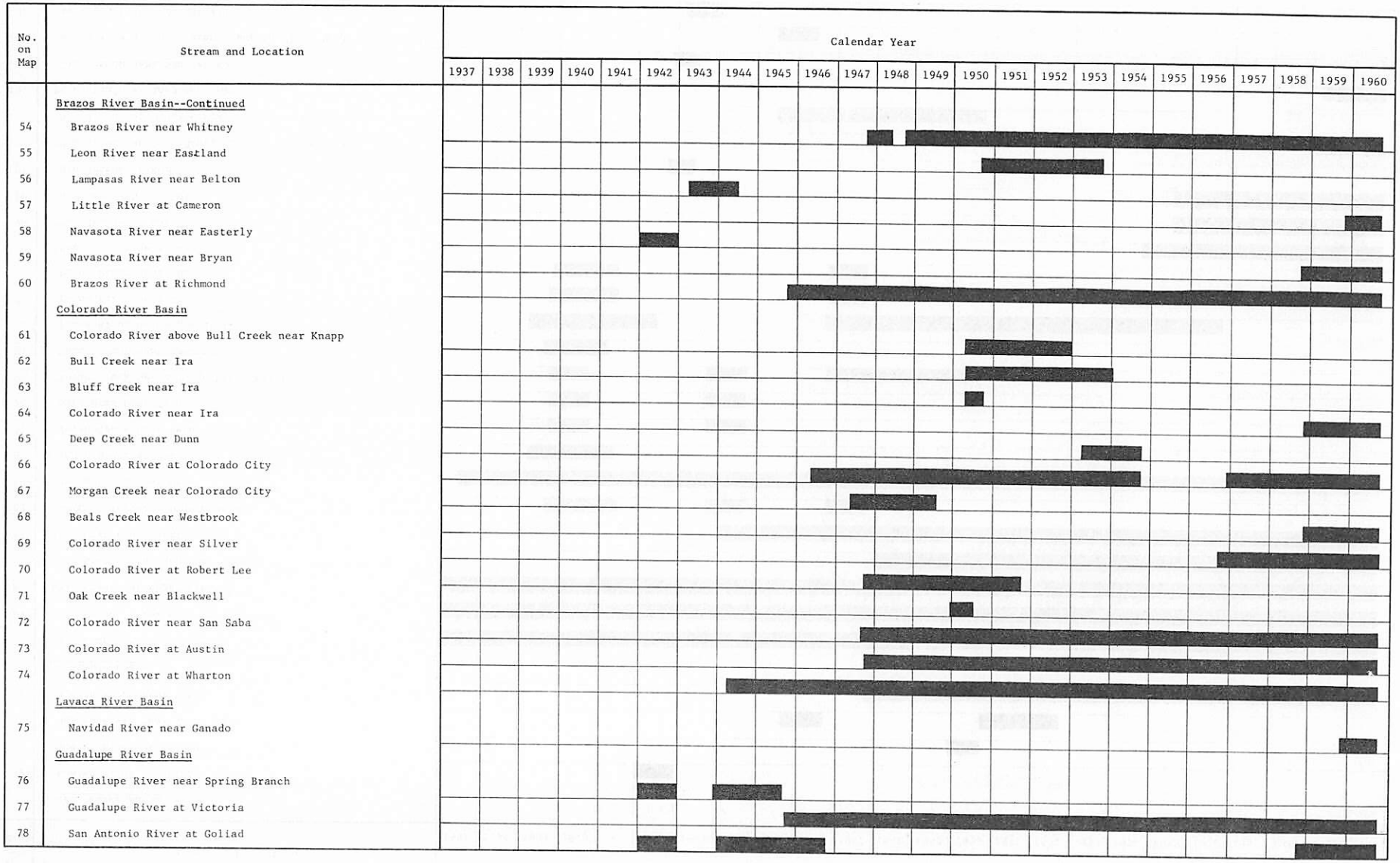
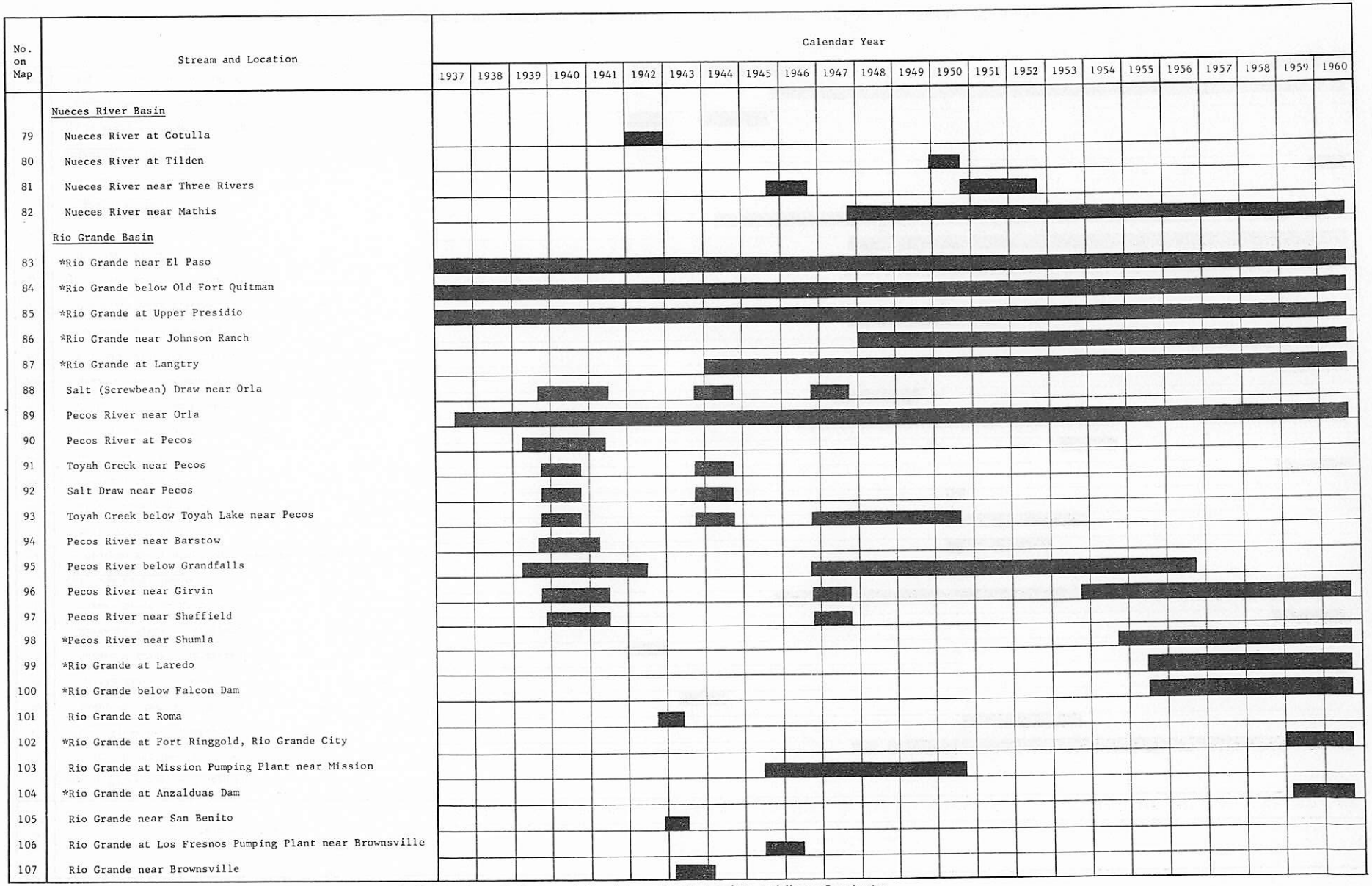



Figure 3.—Periods of operation of quality-of-water sampling stations in Texas--Continued




*Analyses by the U. S. Department of Agriculture, published in Water Bulletins of the International Boundary and Water Commission.

Figure 3.—Periods of operation of quality-of-water sampling stations in Texas--Continued

## TABLES OF ANALYSES

On the following pages, the number preceding a station name is permanently assigned to the station by the U. S. Geological Survey and identifies the station in the national network.

The heading "Chemical analyses, in parts per million, water year October 1959 to September 1960" has been used throughout the following tables. These tables have been prepared by the U. S. Geological Survey, utilizing prepared forms with this heading appearing thereon.

The reader's attention is called to the fact that certain columns of these tables contain values that are not given in parts per million. A listing of these excepted columns follows:

Date of collection

Mean discharge (cfs)

Dissolved solids - Tons per acre-foot

Dissolved solids - Tons per day

Percent sodium

Sodium-adsorption ratio

Specific Conductance (micromhos at 25°C)

pH

Density at 20°C

## 2275. CANADIAN RIVER NEAR AMARILLO, TEX.

LOCATION.--At gaging station at bridge on U. S. Highways 87 and 287, 1,500 feet downstream from Pitcher Creek, 1.7 miles downstream from Panhandle & Santa Fe Railway Co. bridge, and 19 miles north of Amarillo, Potter County (revised).
DRAINAGE AREA.--19,445 square miles, of which 4,069 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: July 1948 to October 1949, February 1950 to September 1960.
Water temperatures: August 1949 to September 1960.
Sediment records: August 1949 to September 1952.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 2,210 ppm Mar. 25; minimum, 395 ppm June 8-14.
Hardness: Maximum, 685 ppm Mar. 25; minimum, 101 ppm Dec. 17, July 4-14.
Specific conductance: Maximum daily, 3,370 micromhos Mar. 25; minimum daily, 401 micromhos June 10.
Water temperatures: Maximum, 82°F Aug. 30; minimum, freezing point on many days during winter months.
EXTREMES, 1948-60.--Dissolved solids: Maximum, 3,000 ppm Mar. 21, 1957; minimum, 252 ppm Sept. 21-30, 1957.
Hardness: Maximum, 974 ppm Mar. 21, 1957; minimum, 69 ppm Sept. 6, 1957.
Specific conductance: Maximum daily, 4,490 micromhos Mar. 21, 1957; minimum daily, 359 micromhos July 6, 1958.
Water temperatures (1949-60): Maximum, 95°F June 29, 1951; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1711.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1, 3-11, 1959 | 194 | 24 | | 54 | 22 | 168 | 6.6 | 201 | 186 | 170 | 1.0 | 9.3 | | a754 | 1.03 | 395 | 225 | 60 | 61 | 4.9 | 1,240 | 7.2 |
| Oct. 2 | 50.0 | -- | | -- | -- | -- | | 215 | -- | 90 | -- | -- | | -- | -- | -- | 143 | 0 | -- | -- | 876 | 8.0 |
| Oct. 12-21 | 20.8 | 43 | | 88 | 37 | 312 | | 259 | 254 | 372 | 1.7 | 54 | | 1,290 | 1.75 | 72.4 | 372 | 159 | 65 | 7.0 | 1,840 | 6.6 |
| Oct. 22-31 | 14.8 | 51 | | 72 | 33 | 227 | | 307 | 186 | 212 | 2.2 | 71 | | 1,010 | 1.37 | 40.4 | 315 | 64 | 61 | 5.6 | 1,600 | 6.8 |
| Nov. 1-10 | 14.4 | 51 | | 76 | 35 | 182 | 18 | 265 | 175 | 215 | 2.4 | 8.1 | | 948 | 1.29 | 36.9 | 334 | 116 | 53 | 4.3 | 1,580 | 6.9 |
| Nov. 11-20 | 11.6 | 52 | | 75 | 36 | 199 | | 326 | 168 | 178 | 2.5 | 84 | | 954 | 1.30 | 29.9 | 335 | 68 | 56 | 4.7 | 1,530 | 7.0 |
| Nov. 21-30 | 10.5 | 52 | | 60 | 34 | 171 | | 262 | 155 | 142 | 2.0 | 98 | | 843 | 1.15 | 23.9 | 290 | 75 | 56 | 4.4 | 1,400 | 6.8 |
| Dec. 1-12 | 12.8 | 55 | | 74 | 35 | 194 | | 359 | 158 | 178 | 2.8 | 24 | | 911 | 1.24 | 31.5 | 328 | 34 | 56 | 4.7 | 1,490 | 6.8 |
| Dec. 13-15 | 139 | 30 | | 105 | 38 | 350 | | 237 | 381 | 400 | 1.1 | 28 | | 1,450 | 1.97 | 544 | 418 | 224 | 65 | 7.5 | 2,300 | 7.6 |
| Dec. 16, 18-22 | 1,025 | 14 | | 40 | 14 | 167 | | 181 | 157 | 146 | .5 | 2.5 | | 630 | .86 | 1,740 | 158 | 9 | 70 | 5.8 | 1,050 | 8.0 |
| Dec. 17 | 4,830 | 20 | | 27 | 8.2 | 108 | | 179 | 82 | 71 | .5 | 4.0 | | 409 | .56 | 5,330 | 101 | 0 | 70 | 4.7 | 642 | 8.0 |
| Dec. 23-31 | 142 | 16 | | 69 | 23 | 252 | | 240 | 257 | 240 | .7 | 11 | | 987 | 1.34 | 378 | 266 | 70 | 67 | 6.7 | 1,580 | 7.5 |
| Jan. 1-10, 1960 | 103 | 26 | | 104 | 36 | 347 | | 284 | 366 | 375 | 1.0 | 20 | | 1,420 | 1.93 | 395 | 408 | 175 | 65 | 7.5 | 2,240 | 7.2 |
| Jan. 11-21 | 117 | 22 | | 100 | 33 | 339 | | 277 | 336 | 378 | 1.0 | 13 | | 1,360 | 1.85 | 430 | 385 | 158 | 66 | 7.5 | 2,200 | 7.2 |
| Jan. 22-31 | 197 | 21 | | 100 | 34 | 359 | | 281 | 352 | 398 | .9 | 12 | | 1,410 | 1.92 | 750 | 390 | 159 | 67 | 7.9 | 2,280 | 7.7 |
| Feb. 1-13 | 221 | 20 | | 72 | 28 | 270 | | 245 | 263 | 280 | .8 | 12 | | 1,070 | 1.46 | 638 | 294 | 94 | 67 | 6.9 | 1,800 | 7.1 |
| Feb. 14-29 | 67.6 | 28 | | 102 | 39 | 328 | | 282 | 349 | 362 | 1.3 | 22 | | 1,370 | 1.86 | 250 | 415 | 184 | 63 | 7.0 | 2,270 | 6.9 |
| Mar. 1-10 | 95.3 | 30 | | 114 | 42 | 363 | | 266 | 385 | 420 | 1.5 | 38 | | 1,520 | 2.07 | 391 | 457 | 239 | 63 | 7.4 | 2,480 | 6.8 |
| Mar. 11-20 | 11.9 | 48 | | 93 | 36 | 274 | | 291 | 264 | 282 | 2.3 | 49 | | 1,210 | 1.65 | 38.9 | 380 | 142 | 61 | 6.1 | 1,970 | 6.6 |
| Mar. 21-24, 26-31 | 101 | 41 | | 73 | 32 | 228 | | 249 | 221 | 222 | 2.2 | 69 | | 1,010 | 1.37 | 275 | 314 | 110 | 61 | 5.6 | 1,580 | 6.7 |
| Mar. 25 | 340 | -- | | -- | -- | -- | | 175 | -- | 640 | -- | -- | | 2,210 | 3.01 | 2,030 | 685 | 542 | -- | -- | 3,370 | 7.9 |
| Apr. 1-4 | 23.2 | 46 | | 80 | 36 | 295 | | 372 | 233 | 270 | 2.2 | 56 | | 1,210 | 1.65 | 75.8 | 348 | 42 | 65 | 6.9 | 1,840 | 7.5 |
| Apr. 5-14 | 15.1 | 53 | | 56 | 33 | 187 | | 472 | 101 | 110 | 2.6 | .5 | | 799 | 1.09 | 32.6 | 275 | 0 | 60 | 4.9 | 1,230 | 7.6 |
| Apr. 15-30 | 14.6 | 51 | | 61 | 32 | 174 | | 470 | 97 | 105 | 2.5 | .2 | | 773 | 1.05 | 30.5 | 284 | 0 | 57 | 4.5 | 1,220 | 7.4 |
| May 1-16 | 10.7 | 57 | | 62 | 28 | 118 | 14 | 322 | 82 | 101 | 2.4 | 85 | | a718 | .98 | 20.7 | 270 | 6 | 47 | 3.1 | 1,180 | 6.4 |
| May 17-31 | 9.59 | 57 | | 63 | 30 | 120 | 19 | 485 | 81 | 102 | 2.4 | .0 | | 759 | 1.03 | 19.7 | 280 | 0 | 39 | 3.1 | 1,190 | 7.0 |
| June 1-7 | 1,866 | 44 | | 49 | 26 | 141 | | 264 | 102 | 123 | 1.6 | 45 | | a689 | .94 | 3,470 | 230 | 13 | 57 | 4.0 | 1,120 | 6.4 |
| June 8-14 | 3,070 | 52 | | 27 | 9.1 | 90 | | 174 | 69 | 60 | .6 | 1.2 | | 395 | .54 | 3,270 | 105 | 0 | 65 | 3.8 | 600 | 7.1 |
| June 15-17, 27-30 | 644 | 18 | | 44 | 15 | 166 | | 200 | 150 | 147 | .7 | 2.8 | | a649 | .88 | 1,130 | 172 | 8 | 68 | 5.5 | 1,070 | 7.2 |
| June 18-26 | 74.0 | 24 | | 86 | 33 | 259 | | 224 | 279 | 300 | 1.2 | 17 | | 1,110 | 1.51 | 222 | 350 | 166 | 62 | 6.0 | 1,830 | 6.9 |
| July 1-3 | 19.5 | 24 | | 57 | 19 | 216 | | 221 | 205 | 202 | .9 | 8.2 | | a849 | 1.15 | 44.7 | 220 | 39 | 68 | 6.3 | 1,370 | 7.8 |
| July 4-14 | 8,392 | 14 | | 26 | 8.8 | 105 | | 170 | 85 | 69 | .5 | 3.0 | | a403 | .55 | 9,130 | 101 | 0 | 69 | 4.5 | 660 | 7.4 |
| July 15-31 | 569 | 15 | | 58 | 20 | 221 | | 189 | 219 | 225 | .6 | 5.9 | | a871 | 1.18 | 1,340 | 226 | 22 | 68 | 6.4 | 1,410 | 7.4 |
| Aug. 1-9, 16-23 | 233 | 18 | | 64 | 22 | 236 | | 195 | 238 | 247 | .7 | 5.6 | | a937 | 1.27 | 589 | 250 | 90 | 67 | 6.5 | 1,570 | 7.2 |
| Aug. 10-15 | 3,553 | 13 | | 29 | 9.1 | 114 | | 164 | 102 | 80 | .5 | 3.0 | | 432 | .59 | 4,140 | 110 | 0 | 69 | 4.7 | 700 | 7.5 |
| Aug. 24-31 | 72.6 | 20 | | 90 | 34 | 395 | | 205 | 360 | 478 | .9 | 5.5 | | 1,480 | 2.01 | 290 | 364 | 196 | 70 | 9.0 | 2,410 | 6.9 |
| Sept. 1-8 | 40.1 | 27 | | 96 | 43 | 469 | | 186 | 455 | 565 | 1.1 | 14 | | 1,760 | 2.39 | 191 | 416 | 264 | 71 | 10 | 2,880 | 7.8 |
| Sept. 9-19 | 411 | 17 | | 50 | 17 | 209 | | 185 | 218 | 188 | .7 | 4.2 | | 795 | 1.08 | 882 | 195 | 44 | 70 | 6.5 | 1,320 | 7.5 |
| Sept. 20-22 | 136 | 21 | | 71 | 25 | 293 | | 216 | 278 | 312 | .9 | 9.9 | | 1,120 | 1.52 | 411 | 280 | 103 | 69 | 7.6 | 1,870 | 7.3 |
| Sept. 23-25 | 1,795 | 14 | | 29 | 10 | 119 | | 158 | 99 | 97 | .6 | 1.0 | | 448 | .61 | 2,170 | 114 | 0 | 69 | 4.8 | 764 | 7.7 |
| Sept. 26-29 | 268 | 15 | | 42 | 14 | 171 | | 189 | 165 | 143 | .7 | 4.8 | | a660 | .90 | 478 | 162 | 8 | 70 | 5.8 | 1,080 | 7.8 |
| Sept. 30 | 149 | -- | | -- | -- | -- | | 212 | -- | 192 | -- | -- | | -- | -- | -- | 228 | 54 | -- | -- | 1,390 | 7.2 |
| Weighted average | 564 | 21 | | 37 | 13 | 137 | | 186 | 121 | 112 | 0.7 | 7.3 | | 548 | 0.75 | 834 | 146 | 0 | 67 | 4.9 | 891 | -- |

a Residue on evaporation at 180°C.

MISCELLANEOUS ANALYSES OF STREAMS IN ARKANSAS RIVER BASIN IN TEXAS

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| EAST AMARILLO CREEK NEAR AMARILLO[1] | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 1, 1959 | 15.8 | 64 | | 52 | 28 | 112 | 318 | 70 | 102 | 2.0 | 6.6 | | | 593 | 0.81 | | 244 | 0 | 50 | 3.1 | 957 | 8.2 |
| Nov. 11 | 12.8 | 71 | | 47 | 34 | 134 | 266 | 82 | 114 | 2.5 | 98 | | | 714 | .97 | | 258 | 40 | 53 | 3.6 | 1,090 | 8.2 |
| Dec. 10 | 13.7 | 68 | | 47 | 34 | 130 | 261 | 76 | 114 | 2.8 | 99 | | | 699 | .95 | | 258 | 44 | 52 | 3.5 | 1,080 | 8.1 |
| Jan. 14, 1960 | 15.8 | 64 | | 52 | 32 | 139 | 397 | 82 | 103 | 2.4 | .2 | | | 670 | .91 | | 261 | 0 | 54 | 3.7 | 1,080 | 7.8 |
| Feb. 11 | 15.9 | 68 | | 54 | 34 | 151 | 478 | 78 | 88 | 2.5 | .2 | | | 711 | .97 | | 274 | 0 | 54 | 4.0 | 1,140 | 7.8 |
| Mar. 10 | 12.3 | 59 | | 54 | 32 | 173 | 500 | 89 | 94 | 2.8 | .5 | | | 750 | 1.02 | | 266 | 0 | 59 | 4.6 | 1,190 | 7.5 |
| Apr. 6 | 10.8 | 62 | | 51 | 34 | 183 | 514 | 81 | 109 | 2.3 | .2 | | | 776 | 1.06 | | 267 | 0 | 60 | 4.9 | 1,280 | 7.3 |
| May 13 | 12.2 | 60 | | 63 | 34 | 177 | 532 | 77 | 112 | 2.8 | .0 | | | 788 | 1.07 | | 297 | 0 | 56 | 4.5 | 1,240 | 7.2 |
| June 6 | 14.2 | 50 | | 48 | 27 | 98 | 253 | 74 | 76 | 2.0 | 59 | | | 558 | .76 | | 232 | 24 | 48 | 2.8 | 869 | 7.2 |
| July 13 | 17.1 | 52 | | 58 | 24 | 139 | 445 | 60 | 81 | 2.3 | .0 | | | 635 | .86 | | 244 | 0 | 55 | 3.9 | 981 | 7.5 |
| Sept. 8 | 17.2 | 56 | | 55 | 28 | 107 | 271 | 64 | 95 | 2.4 | 70 | | | 610 | .83 | | 252 | 30 | 48 | 2.9 | 1,040 | 7.8 |

[1] Part of the flow of East Amarillo Creek is effluent from a sewage treatment plant.

## 2999.3. SALT FORK RED RIVER NEAR HEDLEY, TEX.

LOCATION.--One mile downstream from Whitefish Creek and 9.5 miles northeast of Hedley, Donley County.
DRAINAGE AREA.--868 square miles, of which 209 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: March 1956 to September 1960.
Water temperatures: March 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,090 ppm Nov. 8-9, 17-21, 23-30; minimum, 270 ppm June 7-9.
Hardness: Maximum, 526 ppm Nov. 8-9, 17-21, 23-30; minimum, 147 ppm June 7-9.
Specific conductance: Maximum daily, 1,980 micromhos Nov. 8; minimum daily, 373 micromhos June 7-8.
Water temperatures: Maximum, 97°F June 2; minimum, 34°F Mar. 8.
EXTREMES, 1956-60.--Dissolved solids: Maximum, 2,600 ppm Apr. 30, 1956; minimum, 231 ppm Aug. 29, 1957.
Hardness: Maximum, 1,640 ppm Apr. 30, 1956; minimum, 126 ppm Aug. 29, 1957.
Specific conductance: Maximum daily, 3,530 micromhos Jan. 25, 1957; minimum daily, 373 micromhos June 7-8, 1960.
Water temperatures: Maximum, 97°F June 2, 1960; minimum, freezing point Jan. 16-18, 1957, Feb. 17, 1958.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. No discharge records available. No flow during much of the period.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1-6, 8-15, 1959---- | -- | 38 | | 108 | 39 | 133 | | 135 | 388 | 143 | 0.9 | 2.0 | | 950 | 1.29 | | 430 | 320 | 40 | 2.8 | 1,340 | 7.8 |
| Oct. 7---------- | 25.2 | 54 | | 75 | 35 | 127 | | 113 | 294 | 146 | .8 | 1.5 | | a789 | 1.07 | | 331 | 238 | 46 | 3.0 | 1,220 | 7.9 |
| Oct. 16-31---------- | -- | 36 | | 112 | 40 | 146 | | 124 | 420 | 155 | .9 | 2.0 | | 995 | 1.35 | | 444 | 342 | 42 | 3.0 | 1,400 | 7.8 |
| Nov. 3-7, 10-16, 22----- | -- | 44 | | 80 | 23 | 98 | | 148 | 230 | 101 | .8 | 2.2 | | 673 | .92 | | 294 | 172 | 42 | 2.5 | 976 | 8.0 |
| Nov. 8-9, 17-21, 23-30-- | -- | 46 | | 130 | 49 | 145 | | 113 | 516 | 148 | .9 | 1.8 | | 1,090 | 1.48 | | 526 | 434 | 38 | 2.8 | 1,510 | 7.9 |
| Dec. 1-10---------- | -- | 32 | | 111 | 38 | 130 | | 152 | 380 | 136 | .6 | 2.8 | | 908 | 1.23 | | 434 | 309 | 39 | 2.7 | 1,320 | 7.7 |
| Dec. 11-20---------- | -- | 31 | | 108 | 34 | 133 | | 177 | 336 | 143 | .7 | 1.5 | | 875 | 1.19 | | 410 | 264 | 41 | 2.9 | 1,300 | 7.8 |
| Dec. 21-31---------- | -- | 36 | | 90 | 36 | 137 | | 131 | 324 | 156 | .8 | 2.8 | | 882 | 1.20 | | 372 | 265 | 44 | 3.1 | 1,300 | 7.6 |
| Jan. 1, 1960---------- | -- | 36 | | 78 | 35 | 130 | | 135 | 270 | 160 | .8 | 2.8 | | a779 | 1.06 | | 338 | 228 | 46 | 3.1 | 1,230 | 7.7 |
| Mar. 8---------- | 250 | 22 | | 70 | 23 | 89 | | 164 | 167 | 107 | .6 | 2.8 | | 581 | .79 | | 269 | 134 | 42 | 2.4 | 911 | 7.8 |
| Mar. 9-12, 21-30-------- | -- | 30 | | 100 | 39 | 128 | | 147 | 340 | 147 | .8 | 4.5 | | 908 | 1.23 | | 410 | 290 | 40 | 2.8 | 1,330 | 7.7 |
| Apr. 4-10---------- | -- | 31 | | 104 | 43 | 135 | 5.8 | 144 | 390 | 158 | .8 | 4.8 | | 995 | 1.35 | | 436 | 318 | 40 | 2.8 | 1,430 | 7.7 |
| Apr. 11-16, 20---------- | -- | 36 | | 86 | 41 | 149 | | 106 | 378 | 158 | .7 | 2.5 | | a903 | 1.23 | | 383 | 296 | 46 | 3.3 | 1,350 | 7.5 |
| Apr. 21-30---------- | -- | 30 | | 106 | 44 | 138 | | 111 | 430 | 144 | .8 | 2.5 | | a950 | 1.29 | | 446 | 354 | 40 | 2.8 | 1,410 | 7.7 |
| May 1-4, 6, 17---------- | -- | 31 | | 115 | 46 | 148 | | 113 | 476 | 146 | .7 | 2.2 | | 1,020 | 1.39 | | 476 | 384 | 40 | 2.9 | 1,460 | 7.7 |
| May 5, 11-14, 18-20, 23, 30---------- | -- | 24 | | 88 | 26 | 98 | | 171 | 236 | 106 | .6 | 3.0 | | 709 | .96 | | 326 | 186 | 39 | 2.4 | 1,030 | 7.8 |
| May 7-10, 31---------- | -- | 28 | | 98 | 36 | 125 | | 125 | 378 | 116 | .7 | 2.2 | | 910 | 1.24 | | 392 | 290 | 41 | 2.8 | 1,240 | 7.8 |
| June 1-2, 4-6---------- | -- | 26 | | 85 | 26 | 105 | | 177 | 234 | 110 | .7 | 2.8 | | 724 | .98 | | 319 | 174 | 42 | 2.6 | 1,050 | 7.9 |
| June 3, 10---------- | -- | 19 | | 54 | 12 | 49 | | 155 | 94 | 44 | .5 | 1.5 | | 372 | .51 | | 184 | 57 | 36 | 1.6 | 563 | 7.5 |
| June 7-9---------- | -- | 13 | | 45 | 8.5 | 29 | | 131 | 59 | 27 | .4 | 2.0 | | 270 | .37 | | 147 | 40 | 30 | 1.0 | 413 | 7.6 |
| June 15-26---------- | -- | 30 | | 91 | 28 | 114 | | 162 | 282 | 113 | .7 | 1.8 | | 787 | 1.07 | | 342 | 209 | 42 | 2.7 | 1,120 | 7.8 |
| July 5-12---------- | -- | 44 | | 63 | 26 | 125 | | 95 | 263 | 129 | .8 | .8 | | 712 | .97 | | 264 | 186 | 51 | 3.4 | 1,050 | 7.6 |
| Aug. 18-23---------- | -- | 30 | | 62 | 17 | 73 | | 133 | 157 | 75 | .7 | 3.0 | | 494 | .67 | | 224 | 116 | 41 | 2.1 | 757 | 7.8 |
| Aug. 24---------- | 12.1 | -- | | -- | -- | -- | | 130 | -- | 118 | -- | -- | | -- | -- | | 315 | 208 | -- | -- | 1,100 | 7.7 |
| Sept. 9-20---------- | -- | 35 | | 84 | 29 | 125 | | 137 | 284 | 134 | .8 | 2.0 | | 782 | 1.06 | | 328 | 216 | 45 | 3.0 | 1,160 | 7.8 |
| Sept. 21-30---------- | -- | 37 | | 84 | 32 | 124 | | 116 | 310 | 134 | .8 | 1.8 | | 810 | 1.10 | | 341 | 246 | 44 | 2.9 | 1,200 | 7.7 |

a Calculated from determined constituents.

## 3150. LITTLE WICHITA RIVER NEAR HENRIETTA, TEX.

LOCATION.--At gaging station at bridge on State Highway 148, 1.5 miles northwest of Henrietta, Clay County, and 4 miles upstream from Turkey Creek.
DRAINAGE AREA.--1,037 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1952 to January 1956, March 1959 to September 1960.
Water temperatures: December 1952 to January 1956, March 1959 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 4,120 ppm June 2; minimum, 110 ppm Mar. 26.
Hardness: Maximum, 1,060 ppm June 2; minimum, 49 ppm Oct. 4-7.
Specific conductance: Maximum daily, 7,520 micromhos June 2; minimum daily, 177 micromhos Mar. 26.
EXTREMES, 1952-56, 1959-60.--Dissolved solids: Maximum, 4,120 ppm June 2, 1960; minimum, 57 ppm Mar. 19, 1955.
Hardness: Maximum, 1,060 ppm June 2, 1960; minimum, 25 ppm Feb. 20, 1955.
Specific conductance: Maximum daily, 7,520 micromhos June 2, 1960; minimum daily, 81 micromhos Oct. 24, 1953.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1711.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-2, 1959--------- | 0.55 | 8.6 | | 36 | 9.5 | 141 | 4.3 | 72 | 14 | 255 | 0.4 | 1.5 | | a524 | 0.71 | 0.78 | 129 | 70 | 70 | 5.4 | 979 | 7.1 |
| Oct. 3, 4 (12m-12 p.m.) | 707 | 7.8 | | 17 | 4.8 | 45 | | 61 | 7.8 | 72 | .3 | .8 | | a197 | .27 | 376 | 62 | 12 | 61 | 2.5 | 347 | 6.8 |
| Oct. 4 (12 p.m.-12m). | | | | | | | | | | | | | | | | | | | | | | |
| 5-7------------------ | 2,034 | 7.4 | | 14 | 3.4 | 23 | | 56 | 4.2 | 34 | .3 | .5 | | 115 | .16 | 632 | 49 | 3 | 51 | 1.4 | 212 | 7.4 |
| Oct. 8-9--------------- | 1,780 | 11 | | 18 | 5.2 | 38 | | 68 | 11 | 56 | .1 | 3.2 | | a191 | .26 | 918 | 66 | 11 | 56 | 2.0 | 310 | 7.6 |
| Oct. 10-15------------- | 40.9 | 12 | | 23 | 7.1 | 39 | | 92 | 6.0 | 63 | .1 | 1.2 | | a205 | .28 | 22.6 | 87 | 11 | 50 | 1.8 | 360 | 7.8 |
| Oct. 16-31------------- | b .94 | 15 | | 26 | 7.9 | 47 | | 105 | 6.8 | 75 | .2 | 1.0 | | a242 | .33 | .61 | 97 | 11 | 51 | 2.1 | 424 | 7.6 |
| Nov. 1-5--------------- | b8.78 | 21 | | 30 | 8.0 | 48 | | 110 | 7.4 | 80 | .4 | 1.2 | | 250 | .34 | 5.93 | 108 | 18 | 49 | 2.0 | 448 | 7.3 |
| Nov. 6----------------- | 164 | -- | | -- | -- | -- | | 112 | -- | 440 | -- | -- | | -- | -- | -- | 236 | 144 | -- | -- | 1,620 | 7.8 |
| Nov. 7-11-------------- | 24.3 | 13 | | 40 | 9.9 | 102 | | 92 | 8.8 | 195 | .5 | 1.2 | | 415 | .56 | 27.2 | 140 | 65 | 61 | 3.7 | 800 | 7.1 |
| Nov. 12-30------------- | b .53 | 8.8 | | 54 | 14 | 143 | | 97 | 9.2 | 292 | .5 | 1.2 | | 571 | .78 | .82 | 192 | 112 | 62 | 4.5 | 1,120 | 7.8 |
| Dec. 1-15-------------- | b2.07 | 9.6 | | 57 | 14 | 148 | | 105 | 10 | 300 | .3 | 1.0 | | a648 | .88 | 3.62 | 200 | 114 | 62 | 4.5 | 1,150 | 7.8 |
| Dec. 16---------------- | 288 | 8.6 | | 18 | 5.9 | 34 | | 61 | 9.2 | 58 | .2 | .2 | | 164 | .22 | 128 | 69 | 19 | 51 | 1.8 | 321 | 7.0 |
| Dec. 17---------------- | 696 | 12 | | 37 | 9.7 | 115 | | 86 | 11 | 210 | .2 | 3.5 | | a480 | .65 | 902 | 132 | 62 | 65 | 4.3 | 866 | 7.2 |
| Dec. 18-31------------- | 137 | 9.6 | | 26 | 6.9 | 60 | | 87 | 7.2 | 102 | .2 | 1.5 | | 256 | .35 | 94.7 | 93 | 22 | 58 | 2.7 | 493 | 7.4 |
| Jan. 1-7, 1960--------- | 24.0 | 13 | | 28 | 7.6 | 54 | | 100 | 8.0 | 90 | .3 | .8 | | a451 | .61 | 92.2 | 124 | 62 | 64 | 4.1 | 803 | 7.0 |
| Jan. 8-12, 16---------- | 75.5 | 14 | | 35 | 10 | 104 | | 81 | 8.4 | 198 | .2 | 1.0 | | 249 | .34 | 76.6 | 88 | 24 | 58 | 2.6 | 480 | 7.1 |
| Jan. 13-14------------- | 114 | 16 | | 24 | 6.9 | 57 | | 78 | 7.6 | 98 | .3 | .8 | | -- | -- | -- | 340 | 282 | -- | -- | 2,200 | 7.6 |
| Jan. 15---------------- | 115 | -- | | -- | -- | -- | | 71 | -- | 660 | -- | -- | | 435 | .59 | 16.4 | 131 | 60 | 66 | 4.4 | 856 | 7.0 |
| Jan. 17-31------------- | 14.0 | 8.2 | | 38 | 8.7 | 115 | | 87 | 8.6 | 212 | .2 | 1.0 | | 443 | .60 | 1.02 | 138 | 59 | 65 | 4.3 | 855 | 7.1 |
| Feb. 1-2--------------- | .85 | 10 | | 37 | 11 | 115 | | 96 | 9.0 | 210 | .2 | 4.2 | | 145 | .20 | 129 | 57 | 8 | 54 | 1.8 | 270 | 7.1 |
| Feb. 3----------------- | 330 | 9.4 | | 14 | 5.3 | 31 | | 60 | 6.0 | 46 | .3 | 3.2 | | 224 | .30 | 550 | 87 | 31 | 56 | 2.3 | 449 | 6.9 |
| Feb. 4-7--------------- | 910 | 8.8 | | 23 | 7.1 | 50 | | 68 | 6.8 | 92 | .2 | 3.2 | | 239 | .33 | 11.8 | 96 | 22 | 54 | 2.3 | 460 | 7.2 |
| Feb. 8-20-------------- | 18.3 | 9.8 | | 26 | 7.7 | 52 | | 91 | 7.8 | 89 | .3 | 1.8 | | 262 | .36 | .28 | 104 | 18 | 55 | 2.5 | 501 | 7.1 |
| Feb. 21-29------------- | .39 | 9.4 | | 28 | 8.2 | 59 | | 104 | 8.2 | 96 | .2 | 1.8 | | 266 | .36 | .09 | 111 | 26 | 53 | 2.4 | 505 | 7.1 |
| Mar. 1-12-------------- | b .13 | 11 | | 30 | 8.7 | 57 | | 103 | 8.6 | 98 | .2 | 1.8 | | 269 | .37 | -- | 117 | 29 | 51 | 2.3 | 519 | 7.4 |
| Mar. 13-24------------- | 0 | 8.6 | | 32 | 9.0 | 56 | | 107 | 8.2 | 100 | .2 | 1.8 | | 325 | .44 | 91.3 | 140 | 36 | 52 | 2.5 | 632 | 7.5 |
| Mar. 25---------------- | 104 | 9.0 | | 38 | 11 | 69 | | 127 | 9.0 | 125 | .2 | 1.5 | | 110 | .15 | 72.8 | 56 | 7 | 41 | 1.0 | 204 | 7.0 |
| Mar. 26---------------- | 245 | 7.8 | | 16 | 3.8 | 18 | | 59 | 6.8 | 26 | .2 | 2.8 | | 202 | .27 | 28.9 | 81 | 23 | 54 | 2.1 | 383 | 7.2 |
| Mar. 27-29------------- | 53.0 | 7.2 | | 23 | 5.8 | 44 | | 71 | 7.6 | 76 | .3 | 3.2 | | -- | -- | -- | 175 | 115 | -- | -- | 910 | 7.4 |
| Mar. 30---------------- | 10.0 | -- | | -- | -- | -- | | 73 | -- | -- | -- | -- | | -- | -- | -- | 450 | 388 | -- | -- | 2,500 | 7.2 |
| Mar. 31, Apr. 1-14----- | b .91 | -- | | -- | -- | -- | | 75 | -- | 750 | -- | -- | | -- | -- | -- | 435 | 363 | -- | -- | 2,450 | 6.7 |
| Apr. 15-30------------- | 0 | -- | | -- | -- | -- | | 88 | -- | 730 | -- | -- | | -- | -- | -- | 435 | 352 | -- | -- | 2,330 | 7.3 |
| May 1-20--------------- | 0 | -- | | -- | -- | -- | | 102 | -- | 690 | -- | -- | | -- | -- | -- | 186 | 103 | 70 | 6.3 | 1,350 | 7.5 |
| May 21, 29-31, June 1-- | 20.3 | 10 | | 50 | 15 | 199 | | 102 | 12 | 368 | .4 | 4.8 | | 709 | .96 | 38.9 | 422 | 315 | 68 | 8.8 | 2,830 | 7.6 |
| May 22-24, 27-28------- | 12.7 | 9.6 | | 110 | 36 | 417 | | 131 | 18 | 850 | .4 | 4.0 | | 1,510 | 2.05 | 51.8 | 770 | 708 | -- | -- | 6,210 | 6.8 |
| May 25-26-------------- | 46.0 | -- | | -- | -- | -- | | 75 | -- | 2,050 | -- | -- | | -- | -- | -- | | | | | | |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.

3150. LITTLE WICHITA RIVER NEAR HENRIETTA, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| June 2, 1960 | 115 | -- | | -- | -- | -- | | 58 | -- | 2,500 | -- | -- | | 4,120 | 5.60 | 1,280 | 1,060 | 1,010 | -- | -- | 7,520 | 6.3 |
| June 3 | 124 | -- | | -- | -- | -- | | 106 | -- | 495 | -- | -- | | -- | -- | -- | 236 | 149 | -- | -- | 1,770 | 6.9 |
| June 4-10 | 34.3 | 11 | | 38 | 11 | 133 | | 106 | 11 | 230 | 1.1 | 5.1 | | a520 | 0.71 | 48.2 | 140 | 53 | 67 | 4.9 | 940 | 7.4 |
| June 11-30 | b6.12 | 10 | | 60 | 17 | 269 | | 94 | 23 | 495 | .5 | 5.0 | | 926 | 1.26 | 15.3 | 220 | 142 | 73 | 7.9 | 1,740 | 7.1 |
| July 1-9 | b .60 | -- | | -- | -- | -- | | 106 | -- | 530 | -- | -- | | -- | -- | -- | 238 | 151 | -- | -- | 1,860 | 7.1 |
| July 10-11, 15 | 19.3 | 11 | | 28 | 8.4 | 78 | | 116 | 8.0 | 118 | .4 | 2.5 | | a321 | .44 | 16.7 | 104 | 10 | 62 | 3.3 | 375 | 7.3 |
| July 12-14 | 3.30 | 9.6 | | 18 | 4.9 | 32 | | 94 | 6.8 | 34 | .3 | 3.0 | | 155 | .21 | 1.38 | 65 | 0 | 52 | 1.7 | 269 | 7.1 |
| July 16 | 89.0 | -- | | -- | -- | -- | | 76 | -- | 260 | -- | -- | | -- | -- | -- | 145 | 82 | -- | -- | 965 | 7.0 |
| July 17-31 | b10.0 | 11 | | 34 | 9.0 | 100 | | 100 | 7.4 | 175 | .4 | 2.0 | | a409 | .56 | 11.0 | 122 | 40 | 64 | 3.9 | 726 | 7.4 |
| Aug. 1-15 | 0 | 12 | | 40 | 11 | 112 | | 126 | 8.6 | 195 | .5 | .8 | | a477 | .65 | -- | 145 | 42 | 63 | 4.0 | 851 | 7.6 |
| Aug. 16-31 | 0 | 15 | | 44 | 12 | 116 | | 140 | 8.6 | 202 | .5 | 1.0 | | a502 | .68 | -- | 160 | 45 | 61 | 4.0 | 897 | 7.6 |
| Sept. 1-25 | 0 | -- | | -- | -- | -- | | 159 | -- | 230 | -- | -- | | -- | -- | -- | 174 | 44 | -- | -- | 994 | 7.6 |
| Sept. 26 | 1.00 | -- | | -- | -- | -- | | 113 | -- | 178 | -- | -- | | -- | -- | -- | 120 | 28 | -- | -- | 774 | 7.4 |
| Sept. 27 (12 p.m.-12m) | 68.0 | 5.2 | | 173 | 52 | 598 | | 72 | 23 | 1,320 | .4 | 1.0 | | 2,210 | 3.01 | 406 | 646 | 586 | 67 | 10 | 4,190 | 7.1 |
| Sept. 27 (12m-12 p.m.) | 68.0 | 9.0 | | 16 | 5.7 | 66 | | 71 | 6.2 | 98 | .3 | 3.5 | | 240 | .33 | 44.1 | 63 | 5 | 69 | 3.6 | 463 | 6.8 |
| Sept. 28 (12 p.m.-12m), 29-30 | 158 | 8.6 | | 29 | 8.0 | 94 | | 102 | 7.8 | 154 | .3 | 1.5 | | a380 | .52 | 162 | 106 | 22 | 66 | 4.0 | 682 | 7.1 |
| Sept. 28 (12m-12 p.m.) | 200 | -- | | -- | -- | -- | | 93 | -- | 435 | -- | -- | | -- | -- | -- | 210 | 134 | -- | -- | 1,570 | 6.8 |
| Weighted average | 62.7 | 9.3 | | 25 | 6.9 | 64 | | 70 | 7.7 | 114 | 0.2 | 1.9 | | 270 | 0.37 | 45.7 | 91 | 33 | 61 | 2.9 | 498 | -- |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.

## 3154. LITTLE WICHITA RIVER NEAR RINGGOLD, TEX.

LOCATION.--At gaging station at bridge on County Road (abandoned) 2 miles downstream from East Fork Little Wichita River, about 8 miles northwest of Ringgold, Montague County, and about 11.5 miles upstream from mouth.
DRAINAGE AREA.--1,350 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1959 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 4,440 ppm June 3; minimum, 47 ppm Oct. 3-4.
Hardness: Maximum, 1,150 ppm June 3; minimum, 22 ppm Dec. 16-18, Feb. 3.
Specific conductance: Maximum daily, 7,860 micromhos June 3; minimum daily, 64 micromhos Oct. 3.
EXTREMES, March 1959-September 1960.--Dissolved solids: Maximum, 4,440 ppm June 3, 1960; minimum, 38 ppm Sept. 4, 1959.
Hardness: Maximum, 1,150 ppm June 3, 1960; minimum, 19 ppm Sept. 4, 1959.
Specific conductance: Maximum daily, 7,860 micromhos June 3, 1960; minimum daily, 60 micromhos Sept. 4, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1711.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-2, 1959 | 3.20 | 10 | | 27 | 8.1 | 94 | 4.8 | 77 | 13 | 168 | 0.3 | 1.5 | | 365 | 0.50 | 3.15 | 101 | 38 | 66 | 4.1 | 700 | 7.5 |
| Oct. 3-4 | 1,366 | 10 | | 4.5 | 2.9 | | 6.3 | 33 | 1.4 | 5.0 | .2 | 1.0 | | 47 | .06 | 173 | 23 | 0 | 37 | .6 | 72 | 7.4 |
| Oct. 5-10 | 2,770 | 11 | | 12 | 3.5 | | 23 | 53 | 3.8 | 32 | .2 | 1.5 | | 113 | .15 | 845 | 44 | 1 | 53 | 1.5 | 195 | 7.2 |
| Oct. 11-20 | 23.8 | 14 | | 24 | 7.4 | | 35 | 105 | 7.0 | 51 | .2 | 1.2 | | a198 | .27 | 12.7 | 90 | 4 | 46 | 1.6 | 341 | 7.6 |
| Oct. 21-31 | 1.39 | 17 | | 35 | 10 | | 39 | 156 | 6.2 | 56 | .2 | .5 | | a246 | .33 | .92 | 128 | 1 | 40 | 1.5 | 430 | 7.8 |
| Nov. 1-6 | 67.5 | 12 | | 29 | 9.1 | | 37 | 123 | 8.6 | 56 | .2 | .8 | | a228 | .31 | 41.6 | 110 | 9 | 42 | 1.5 | 387 | 7.2 |
| Nov. 7 | 118 | -- | | -- | -- | | -- | 98 | -- | 400 | -- | -- | | -- | -- | -- | 232 | 152 | -- | -- | 1,440 | 7.8 |
| Nov. 8-17 | 8.67 | 10 | | 33 | 9.4 | | 70 | 116 | 8.4 | 120 | .2 | .8 | | a334 | .45 | 7.82 | 121 | 26 | 56 | 2.8 | 589 | 7.0 |
| Nov. 18-30 | .63 | 18 | | 36 | 9.9 | | 68 | 139 | 10 | 108 | .2 | .2 | | a346 | .47 | .59 | 130 | 16 | 53 | 2.6 | 580 | 6.9 |
| Dec. 1-13 | .20 | 19 | | 43 | 12 | | 63 | 172 | 9.6 | 100 | .3 | .5 | | a342 | .47 | .18 | 157 | 16 | 47 | 2.2 | 602 | 7.8 |
| Dec. 14-15, 19-28 | 190 | 9.6 | | 24 | 7.1 | | 56 | 89 | 7.8 | 91 | .2 | 1.0 | | 241 | .33 | 124 | 89 | 16 | 58 | 2.6 | 464 | 6.9 |
| Dec. 16-18 | 1,401 | 9.6 | | 4.7 | 2.5 | | 8.3 | 32 | 3.0 | 7.0 | .2 | .5 | | 52 | .07 | 197 | 22 | 0 | 45 | .8 | 84 | 6.6 |
| Dec. 29-30 | 17.0 | 11 | | 67 | 21 | 180 | 7.1 | 115 | 18 | 375 | .2 | 2.0 | | 738 | 1.00 | 33.9 | 254 | 160 | 60 | 4.9 | 1,450 | 7.4 |
| Dec. 31 | 12.0 | -- | | -- | -- | | -- | 169 | -- | 134 | -- | -- | | -- | -- | -- | 189 | 50 | -- | -- | 734 | 8.2 |
| Jan. 1-5, 7-11, 17-19, 1960 | 50.4 | 12 | | 33 | 9.8 | | 65 | 112 | 11 | 113 | .3 | .8 | | 300 | .41 | 40.8 | 123 | 31 | 53 | 2.5 | 576 | 6.8 |
| Jan. 6, 12-15 | 374 | 10 | | 20 | 5.1 | | 40 | 76 | 7.8 | 61 | .3 | .8 | | 182 | .25 | 184 | 71 | 9 | 55 | 2.1 | 340 | 6.7 |
| Jan. 16 | 110 | -- | | -- | -- | | -- | 77 | -- | 308 | -- | -- | | -- | -- | -- | 196 | 133 | -- | -- | 1,140 | 6.9 |
| Jan. 20-31, Feb. 1-2 | 11.1 | 18 | | 44 | 13 | | 92 | 137 | 15 | 166 | .3 | 1.0 | | 416 | .57 | 12.5 | 164 | 51 | 55 | 3.1 | 786 | 7.6 |
| Feb. 3 | 390 | 18 | | 1.7 | 4.3 | | 6.1 | 25 | 4.8 | 5.0 | .4 | 2.0 | | 54 | .07 | 56.9 | 22 | 2 | 38 | .6 | 72 | 6.9 |
| Feb. 4 | 1,530 | -- | | -- | -- | | -- | 56 | -- | 49 | -- | -- | | -- | -- | -- | 58 | 12 | -- | -- | 271 | 7.3 |
| Feb. 5-13 | 512 | 14 | | 24 | 7.3 | | 47 | 88 | 8.8 | 76 | .3 | 2.5 | | 223 | .30 | 308 | 90 | 18 | 53 | 2.2 | 419 | 7.3 |
| Feb. 14-21 | 7.14 | 11 | | 41 | 13 | | 72 | 164 | 15 | 114 | .2 | 1.5 | | 349 | .47 | 6.73 | 156 | 22 | 50 | 2.5 | 649 | 7.5 |
| Feb. 22-29 | 3.32 | 11 | | 58 | 18 | | 101 | 230 | 23 | 158 | .3 | .8 | | 483 | .66 | 4.33 | 210 | 30 | 50 | 3.0 | 891 | 7.7 |
| Mar. 1-10 | 2.86 | 10 | | 82 | 25 | | 147 | 289 | 33 | 250 | .3 | 2.5 | | a754 | 1.03 | 5.82 | 308 | 70 | 51 | 3.6 | 1,270 | 8.0 |
| Mar. 11-20 | 1.63 | 7.8 | | 90 | 31 | | 191 | 366 | 41 | 300 | .2 | 2.5 | | a878 | 1.19 | 3.86 | 352 | 52 | 54 | 4.4 | 1,470 | 7.8 |
| Mar. 21-24 | .70 | 7.8 | | 76 | 26 | | 143 | 318 | 40 | 215 | .4 | 1.2 | | a695 | .95 | 1.31 | 296 | 36 | 51 | 3.6 | 1,210 | 8.0 |
| Mar. 25-31, Apr. 1-3 | 95.4 | 11 | | 27 | 8.2 | 50 | 5.5 | 98 | 15 | 84 | .3 | 2.8 | | 252 | .34 | 64.9 | 101 | 21 | 50 | 2.2 | 461 | 7.5 |
| Apr. 4-13 | 1.51 | 12 | | 48 | 14 | | 76 | 193 | 24 | 112 | .4 | .8 | | a408 | .55 | 1.66 | 178 | 20 | 48 | 2.5 | 697 | 7.8 |
| Apr. 14-27 | 2.34 | 12 | | 59 | 18 | | 79 | 255 | 25 | 111 | .4 | 1.2 | | a442 | .60 | 2.79 | 221 | 12 | 44 | 2.3 | 783 | 7.5 |
| Apr. 28 | 13.0 | 8.6 | | 24 | 8.1 | | 33 | 113 | 18 | 36 | .4 | 3.2 | | 187 | .25 | 6.56 | 93 | 1 | 44 | 1.5 | 336 | 7.8 |
| Apr. 29-30 | 4.20 | 8.8 | | 45 | 15 | | 69 | 152 | 26 | 120 | .4 | 3.0 | | 362 | .49 | 4.11 | 174 | 50 | 46 | 2.3 | 682 | 7.4 |
| May 1-5 | 1.16 | 9.4 | | 37 | 13 | | 53 | 147 | 21 | 82 | .4 | 2.8 | | a317 | .43 | .99 | 146 | 26 | 44 | 1.9 | 539 | 7.3 |
| May 6-19 | b1.73 | 8.0 | | 150 | 50 | | 567 | 121 | 42 | 1,180 | .4 | 4.8 | | 2,060 | 2.80 | 9.62 | 579 | 480 | 68 | 10 | 3,910 | 6.9 |
| May 20-21 | 1.85 | 9.4 | | 73 | 25 | | 272 | 132 | 23 | 525 | .5 | 2.8 | | 996 | 1.35 | 4.98 | 285 | 177 | 67 | 7.0 | 1,900 | 7.5 |
| May 22 | 12.0 | 11 | | 40 | 16 | | 155 | 128 | 20 | 265 | .6 | 3.0 | | a615 | .84 | 19.9 | 166 | 61 | 67 | 5.2 | 1,090 | 7.6 |
| May 23-26 | 20.7 | 11 | | 114 | 35 | | 317 | 124 | 25 | 700 | .5 | 1.2 | | 1,260 | 1.71 | 70.4 | 428 | 327 | 62 | 6.7 | 2,390 | 7.3 |
| May 27-29 | 23.0 | 9.4 | | 128 | 45 | | 636 | 90 | 32 | 1,260 | .6 | 1.5 | | 2,160 | 2.94 | 134 | 504 | 430 | 73 | 12 | 4,000 | 7.0 |
| May 30-31 | 7.45 | 8.2 | | 81 | 27 | | 422 | 84 | 28 | 800 | .6 | 2.2 | | 1,410 | 1.92 | 28.4 | 313 | 244 | 75 | 10 | 2,660 | 7.1 |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.

3154. LITTLE WICHITA RIVER NEAR RINGGOLD, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| June 1-2, 1960 | 54.0 | 7.8 | | 68 | 21 | 328 | | 90 | 18 | 518 | 0.6 | 2.8 | | 1,110 | 1.51 | 162 | 256 | 182 | 74 | 8.9 | 2,110 | 7.1 |
| June 3 | 133 | 10 | | 302 | 96 | 1,260 | | 60 | 62 | 2,580 | .5 | -- | | 4,440 | 6.04 | 1,590 | 1,150 | 1,100 | 71 | 16 | 7,860 | 6.8 |
| June 4-8 | 30.7 | 11 | | 50 | 15 | 206 | | 104 | 15 | 375 | .5 | 3.0 | | a790 | 1.07 | 65.5 | 186 | 102 | 71 | 6.6 | 1,390 | 7.5 |
| June 9-11 | 49.0 | 10 | | 35 | 11 | 111 | | 126 | 12 | 180 | .5 | 2.0 | | a446 | .61 | 59.0 | 132 | 29 | 64 | 4.2 | 790 | 7.5 |
| June 12-13 | 18.5 | -- | | -- | -- | -- | | 94 | -- | 585 | -- | -- | | -- | -- | -- | 244 | 167 | -- | -- | 2,010 | 7.4 |
| June 14 | 98.0 | -- | | -- | -- | -- | | 108 | -- | 140 | -- | -- | | -- | -- | -- | 134 | 46 | -- | -- | 650 | 7.6 |
| June 15 | 123 | 14 | | 17 | 4.9 | 42 | | 58 | 8.4 | 67 | .4 | 3.0 | | 186 | .25 | 61.8 | 62 | 14 | 60 | 2.3 | 330 | 7.4 |
| June 16-30 | b3.29 | 11 | | 44 | 14 | 155 | | 96 | 15 | 290 | .5 | 1.2 | | 578 | .79 | 5.13 | 168 | 89 | 67 | 5.2 | 1,110 | 7.3 |
| July 1-5, 12-15 | b2.08 | 9.0 | | 52 | 16 | 196 | | 120 | 15 | 358 | .5 | 2.2 | | a775 | 1.05 | 4.35 | 196 | 97 | 69 | 6.1 | 1,360 | 6.9 |
| July 6-7, 11 | 45.7 | 7.8 | | 31 | 10 | 126 | | 69 | 12 | 228 | .4 | 2.5 | | 452 | .61 | 55.8 | 118 | 62 | 70 | 5.0 | 875 | 6.7 |
| July 8 | 141 | 6.4 | | 8.5 | 2.6 | 8.9 | | 40 | 5.4 | 7.0 | .3 | 2.8 | | 62 | .08 | 23.6 | 32 | 0 | 38 | .7 | 96 | 7.2 |
| July 9-10, 16-17 | 62.8 | 9.4 | | 20 | 6.1 | 47 | | 70 | 7.8 | 77 | .3 | 2.5 | | 204 | .28 | 34.6 | 75 | 18 | 58 | 2.4 | 382 | 7.4 |
| July 18-19, 21-22 | 41.2 | 8.8 | | 25 | 6.7 | 81 | | 80 | 8.0 | 134 | .3 | 2.8 | | a336 | .46 | 37.4 | 90 | 24 | 66 | 3.7 | 578 | 6.7 |
| July 20, 23-28 | 11.6 | 8.6 | | 15 | 2.9 | 30 | | 63 | 5.4 | 39 | .3 | 2.8 | | 135 | .18 | 4.23 | 49 | 0 | 57 | 1.9 | 242 | 6.6 |
| July 29-31 | .17 | 11 | | 22 | 6.1 | 35 | | 94 | 5.8 | 50 | .3 | 2.2 | | 178 | .24 | .08 | 80 | 3 | 49 | 1.7 | 334 | 7.1 |
| Aug. 1-31 | 0 | 12 | | 26 | 7.8 | 40 | | 123 | 4.0 | 55 | .3 | 2.0 | | 207 | .28 | -- | 97 | 0 | 48 | 1.8 | 393 | 7.2 |
| Sept. 1-30 | b19.5 | 11 | | 33 | 9.1 | 106 | | 108 | 8.6 | 178 | .4 | 2.5 | | 402 | .55 | 21.2 | 120 | 32 | 66 | 4.2 | 770 | 7.2 |
| Weighted average | 108 | 11 | | 17 | 5.4 | 40 | | 63 | 6.0 | 66 | 0.2 | 1.5 | | 180 | 0.24 | 52.5 | 65 | 13 | 57 | 2.2 | 326 | -- |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.

## 3160. RED RIVER NEAR GAINESVILLE, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 77, a quarter of a mile downstream from Gulf, Colorado and Santa Fe Railway Co. bridge, 5 miles downstream from Fish Creek, 7 miles north of Gainesville, Cooke County, and at mile 791.5.
DRAINAGE AREA.--30,782 square miles, of which 5,936 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: May 1944 to April 1946, October 1952 to September 1960.
Water temperatures: October 1952 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 4,760 ppm July 1-8; minimum, 217 ppm Oct. 4.
Hardness: Maximum, 1,240 ppm July 1-8; minimum, 116 ppm Oct. 4.
Specific conductance: Maximum daily, 7,810 micromhos Sept. 2; minimum daily, 362 micromhos Oct. 4.
Water temperatures: Maximum, 86°F on several days during July and August; minimum, 33°F on several days during November, January, and March.
EXTREMES, 1944-46, 1952-60.--Dissolved solids: Maximum, 6,480 ppm Apr. 11, 1953; minimum, 115 ppm Nov. 4, 1957.
Hardness: Maximum, 1,510 ppm Apr. 11, 1953; minimum, 83 ppm Nov. 4, 1957.
Specific conductance: Maximum daily, 9,890 micromhos Apr. 11, 1953; minimum daily, 176 micromhos Nov. 4, 1957.
Water temperatures (1952-60): Maximum, 95°F July 13, 1954; minimum, freezing point Dec. 23, 1953, Jan. 21, 1954, Jan. 16-17, 1957, Jan. 21, 1959.
REMARKS.--Records of specific conductance of daily samples for period May 1944 to April 1946 available in district office at Austin, Tex. Records of specific conductance of daily samples for period October 1952 to September 1960 available in district office at Oklahoma City, Okla. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1711.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-3, 1959 | 3,683 | -- | -- | 74 | 16 | | 140 | 114 | 149 | 215 | -- | 3.3 | | 685 | 0.93 | 6,810 | 250 | 156 | 55 | 3.8 | 1,180 | 8.0 |
| Oct. 4 | 27,900 | -- | -- | 36 | 6.3 | | 32 | 108 | 32 | 45 | -- | .4 | | 217 | .30 | 16,350 | 116 | 28 | 38 | 1.3 | 362 | 7.9 |
| Oct. 5-10 | 34,720 | -- | -- | 54 | 12 | | 71 | 110 | 90 | 110 | -- | 2.0 | | 419 | .57 | 39,280 | 185 | 95 | 46 | 2.3 | 733 | 7.9 |
| Oct. 11-14 | 4,570 | -- | -- | 73 | 17 | | 132 | 122 | 133 | 210 | -- | 3.9 | | 658 | .89 | 8,120 | 250 | 130 | 53 | 3.6 | 1,110 | 7.8 |
| Oct. 15-31 | 1,120 | -- | -- | 148 | 44 | | 359 | 178 | 325 | 600 | -- | 1.3 | | 1,660 | 2.26 | 5,020 | 550 | 404 | 59 | 6.7 | 2,690 | 7.1 |
| Nov. 1-5 | 999 | -- | -- | 152 | 53 | | 442 | 170 | 344 | 750 | -- | 1.1 | | 1,890 | 2.57 | 5,100 | 595 | 456 | 62 | 7.9 | 3,080 | 8.1 |
| Nov. 6-11 | 5,008 | -- | -- | 66 | 18 | | 120 | 132 | 98 | 205 | -- | 1.8 | | 605 | .82 | 8,180 | 240 | 132 | 52 | 3.4 | 1,060 | 7.9 |
| Nov. 12 | 1,330 | -- | -- | 66 | 16 | | 128 | 134 | 85 | 218 | -- | 2.0 | | 617 | .84 | 2,220 | 230 | 120 | 55 | 3.7 | 1,040 | 8.1 |
| Nov. 13 | 1,130 | -- | -- | 86 | 24 | | 207 | 140 | 137 | 360 | -- | 2.0 | | 953 | 1.30 | 2,910 | 315 | 200 | 59 | 5.1 | 1,590 | 8.0 |
| Nov. 14-30 | 613 | -- | -- | 178 | 54 | | 447 | 240 | 367 | 750 | -- | 1.8 | | 2,000 | 2.72 | 3,310 | 665 | 468 | 59 | 7.5 | 3,280 | 7.8 |
| Dec. 1-10 | 463 | -- | -- | 202 | 74 | | 580 | 248 | 472 | 975 | -- | 1.4 | | 2,550 | 3.47 | 3,190 | 810 | 607 | 61 | 8.9 | 4,050 | 8.0 |
| Dec. 11-13 | 436 | -- | -- | 210 | 79 | | 593 | 266 | 491 | 1,000 | -- | -- | | 2,670 | 3.63 | 3,140 | 850 | 632 | 60 | 8.8 | 4,190 | 8.2 |
| Dec. 14-18 | 5,046 | -- | -- | 105 | 31 | | 237 | 164 | 204 | 395 | -- | 1.1 | | 1,120 | 1.52 | 15,260 | 390 | 256 | 57 | 5.2 | 1,850 | 8.1 |
| Dec. 19 | 30,200 | -- | -- | 154 | 32 | | 470 | 130 | 353 | 750 | -- | 6.9 | | 1,870 | 2.54 | 152,500 | 515 | 408 | 66 | 9.0 | 3,070 | 8.1 |
| Dec. 20-31 | 7,554 | -- | 0.00 | 166 | 33 | 300 | 2.0 | 166 | 272 | 520 | 0.0 | -- | | 1,510 | 2.05 | 30,800 | 550 | 414 | 54 | 5.6 | 2,530 | 7.7 |
| Jan. 1-10, 1960 | 2,207 | 15 | .04 | 192 | 48 | 524 | 12 | 216 | 402 | 870 | .4 | 2.3 | | 2,270 | 3.09 | 13,530 | 675 | 498 | 62 | 8.8 | 3,630 | 7.2 |
| Jan. 11-12 | 3,010 | -- | -- | 80 | 20 | | 161 | 146 | 130 | 265 | -- | 2.4 | | 798 | 1.09 | 6,490 | 280 | 160 | 56 | 4.2 | 1,300 | 8.2 |
| Jan. 13-15 | 7,033 | -- | -- | 107 | 31 | | 287 | a156 | 216 | 470 | -- | 2.8 | | 1,300 | 1.77 | 24,690 | 395 | 267 | 61 | 6.3 | 2,100 | 8.3 |
| Jan. 16-19 | 4,718 | -- | -- | 158 | 46 | | 484 | 180 | 346 | 800 | -- | 2.5 | | 2,160 | 2.94 | 27,520 | 585 | 438 | 64 | 8.7 | 3,360 | 8.1 |
| Jan. 20-31 | 2,154 | 14 | .00 | 208 | 71 | 641 | 10 | 232 | 492 | 1,050 | .3 | -- | | 2,710 | 3.69 | 15,760 | 810 | 620 | 63 | 9.8 | 4,340 | 8.2 |
| Feb. 1-2 | 1,355 | -- | -- | 254 | 77 | | 734 | b288 | 592 | 1,200 | -- | -- | | 3,200 | 4.35 | 11,710 | 950 | 714 | 63 | 10 | 4,860 | 8.4 |
| Feb. 3-12 | 6,170 | -- | -- | 145 | 46 | | 338 | 166 | 343 | 560 | -- | 2.4 | | 1,670 | 2.27 | 27,820 | 550 | 414 | 57 | 6.3 | 2,620 | 8.2 |
| Feb. 13 | 3,180 | -- | -- | 198 | 79 | | 831 | 74 | 637 | 1,350 | -- | -- | | 3,330 | 4.53 | 28,590 | 820 | 760 | 69 | 13 | 5,170 | 8.1 |
| Feb. 14-29 | 1,562 | -- | -- | 178 | 57 | | 468 | 144 | 499 | 750 | -- | 3.2 | | 2,150 | 2.92 | 9,070 | 680 | 562 | 60 | 7.8 | 3,300 | 8.2 |
| Mar. 1-9 | 1,134 | -- | -- | 222 | 70 | | 517 | 256 | 528 | 850 | -- | 6.4 | | 2,460 | 3.35 | 7,530 | 840 | 630 | 57 | 7.7 | 3,690 | 8.1 |
| Mar. 10 | 894 | -- | -- | 182 | 84 | | 670 | 64 | 600 | 1,120 | -- | -- | | 2,900 | 3.94 | 7,000 | 800 | 748 | 65 | 10 | 4,460 | 7.8 |
| Mar. 11-25 | 1,126 | -- | -- | 252 | 71 | | 617 | 250 | 621 | 1,000 | -- | -- | | 2,860 | 3.89 | 8,690 | 920 | 715 | 59 | 8.8 | 4,350 | 8.1 |
| Mar. 26 | 2,820 | -- | -- | 102 | 29 | | 186 | 150 | 217 | 305 | -- | .4 | | 994 | 1.35 | 7,570 | 375 | 252 | 52 | 4.2 | 1,620 | 7.8 |
| Mar. 27 | 3,740 | -- | -- | 145 | 47 | | 336 | 184 | 303 | 580 | -- | .2 | | 1,630 | 2.22 | 16,460 | 555 | 404 | 57 | 6.2 | 2,580 | 8.0 |
| Mar. 28-29 | 3,230 | -- | -- | 108 | 39 | | 218 | 156 | 239 | 372 | -- | 3.3 | | 1,160 | 1.58 | 10,120 | 430 | 302 | 52 | 4.6 | 1,860 | 8.1 |
| Mar. 30-31 | 1,470 | -- | -- | 164 | 74 | | 391 | 186 | 406 | 700 | -- | 3.0 | | 1,940 | 2.64 | 7,700 | 715 | 562 | 54 | 6.4 | 3,050 | 8.1 |
| Apr. 1-6 | 1,253 | -- | -- | 226 | 74 | | 653 | 166 | 646 | 1,050 | -- | -- | | 2,910 | 3.96 | 9,840 | 870 | 734 | 62 | 9.6 | 4,370 | 8.1 |
| Apr. 7 | 1,330 | -- | -- | 196 | 77 | | 553 | 168 | 543 | 925 | -- | .4 | | 2,560 | 3.48 | 9,190 | 805 | 668 | 60 | 8.5 | 3,930 | 8.2 |
| Apr. 8-10 | 946 | -- | -- | 182 | 71 | | 538 | 154 | 565 | 850 | -- | 1.1 | | 2,420 | 3.29 | 6,180 | 745 | 619 | 61 | 8.6 | 3,680 | 8.2 |
| Apr. 11-20 | 725 | -- | -- | 192 | 78 | | 565 | 162 | 533 | 950 | -- | -- | | 2,410 | 3.28 | 4,720 | 800 | 667 | 61 | 8.7 | 3,890 | 8.2 |
| Apr. 21-24 | 560 | -- | -- | 184 | 78 | | 618 | a158 | 534 | 1,020 | -- | -- | | 2,700 | 3.67 | 4,080 | 780 | 650 | 63 | 9.6 | 4,120 | 8.4 |
| Apr. 25-27 | 584 | -- | -- | 204 | 82 | | 678 | 170 | 603 | 1,100 | -- | -- | | 2,950 | 4.01 | 4,650 | 845 | 706 | 64 | 10 | 4,490 | 7.6 |
| Apr. 28-30 | 573 | -- | -- | 180 | 70 | | 523 | 192 | 494 | 850 | -- | .4 | | 2,380 | 3.24 | 3,680 | 735 | 578 | 61 | 8.4 | 3,630 | 8.2 |

a Includes equivalent of 4 parts per million carbonate ($CO_3$).
b Includes equivalent of 14 parts per million carbonate ($CO_3$).

3160. RED RIVER NEAR GAINESVILLE, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| May 1-8, 1960 | 523 | -- | -- | 212 | 71 | 627 | | 194 | 521 | 1,050 | -- | -- | | 2,700 | 3.67 | 3,810 | 820 | 661 | 62 | 9.5 | 4,200 | 7.6 |
| May 9 | 2,330 | -- | -- | 152 | 66 | 509 | | a130 | 365 | 900 | -- | 1.9 | | 2,200 | 2.99 | 13,840 | 650 | 544 | 63 | 8.7 | 3,520 | 8.4 |
| May 10 | 3,090 | -- | -- | 130 | 37 | 325 | | c172 | 264 | 540 | -- | 4.5 | | 1,490 | 2.03 | 12,430 | 475 | 334 | 60 | 6.5 | 2,330 | 8.5 |
| May 11 | 2,130 | -- | -- | 102 | 31 | 268 | | 146 | 188 | 460 | -- | .1 | | 1,260 | 1.71 | 7,250 | 380 | 260 | 61 | 6.0 | 1,970 | 8.2 |
| May 12-22 | 691 | -- | -- | 158 | 48 | 455 | | 158 | 342 | 775 | -- | 1.9 | | 1,970 | 2.68 | 3,680 | 590 | 460 | 63 | 8.2 | 3,120 | 7.6 |
| May 23-26 | 3,732 | -- | -- | 103 | 30 | 199 | | 140 | 207 | 340 | -- | 3.7 | | 1,050 | 1.43 | 10,580 | 380 | 266 | 53 | 4.4 | 1,670 | 7.5 |
| May 27 | 1,380 | -- | -- | 168 | 39 | 363 | | a148 | 400 | 590 | -- | .4 | | 1,720 | 2.34 | 6,410 | 580 | 459 | 58 | 6.6 | 2,680 | 8.3 |
| May 28-31 | 1,168 | -- | -- | 220 | 62 | 567 | | 172 | 534 | 950 | -- | 1.7 | | 2,600 | 3.54 | 8,200 | 805 | 664 | 60 | 8.7 | 3,950 | 7.7 |
| June 1-10 | 4,449 | -- | -- | 168 | 49 | 514 | | 138 | 407 | 850 | -- | 3.7 | | 2,220 | 3.02 | 26,670 | 620 | 507 | 64 | 9.0 | 3,410 | 7.7 |
| June 11-20 | 9,569 | -- | -- | 248 | 39 | 635 | | 122 | 692 | 950 | -- | .2 | | 2,800 | 3.81 | 72,340 | 780 | 680 | 64 | 9.9 | 4,030 | 8.2 |
| June 21-30 | 1,149 | -- | -- | 304 | 59 | 779 | | 154 | 841 | 1,200 | -- | -- | | 3,480 | 4.73 | 10,800 | 1,000 | 874 | 63 | 11 | 5,090 | 8.2 |
| July 1-8 | 799 | -- | -- | 348 | 90 | 1,190 | | 138 | 990 | 1,900 | -- | -- | | 4,760 | 6.47 | 10,270 | 1,240 | 1,130 | 68 | 15 | 7,080 | 8.0 |
| July 9 | 9,050 | -- | -- | 149 | 37 | 406 | | 148 | 369 | 640 | -- | .0 | | 1,810 | 2.46 | 44,230 | 525 | 404 | 63 | 7.7 | 2,790 | 7.9 |
| July 10 | 10,800 | -- | -- | 66 | 15 | 136 | | 122 | 108 | 218 | -- | .0 | | 667 | .91 | 19,450 | 225 | 125 | 57 | 3.9 | 1,090 | 7.9 |
| July 11-12 | 7,435 | -- | -- | 139 | 19 | 275 | | 88 | 311 | 445 | -- | .0 | | 1,340 | 1.82 | 26,900 | 425 | 353 | 58 | 5.8 | 2,050 | 7.4 |
| July 13-18 | 3,873 | -- | -- | 268 | 54 | 830 | | 116 | 737 | 1,300 | -- | -- | | 3,490 | 4.75 | 36,500 | 890 | 795 | 67 | 12 | 5,110 | 8.0 |
| July 19 | 2,350 | -- | -- | 151 | 30 | 417 | | 110 | 384 | 650 | -- | .0 | | 1,810 | 2.46 | 11,480 | 500 | 410 | 64 | 8.1 | 2,860 | 7.8 |
| July 20-23 | 2,115 | -- | -- | 206 | 39 | 673 | | 114 | 542 | 1,050 | -- | -- | | 2,730 | 3.71 | 15,590 | 675 | 582 | 68 | 11 | 4,140 | 7.6 |
| July 24 | 4,780 | -- | -- | 128 | 28 | 376 | | 122 | 327 | 575 | -- | .0 | | 1,620 | 2.20 | 20,910 | 435 | 335 | 65 | 7.8 | 2,550 | 7.7 |
| July 25-26 | 2,655 | -- | -- | 90 | 21 | 242 | | 112 | 193 | 385 | -- | .0 | | 1,090 | 1.48 | 7,810 | 310 | 218 | 63 | 6.0 | 1,730 | 7.7 |
| July 27-31 | 2,432 | -- | -- | 220 | 45 | 636 | | 124 | 583 | 1,000 | -- | -- | | 2,760 | 3.75 | 18,120 | 735 | 634 | 65 | 10 | 4,100 | 7.9 |
| Aug. 1-7 | 890 | -- | -- | 196 | 48 | 436 | | 140 | 551 | 670 | -- | 1.0 | | 2,070 | 2.82 | 4,970 | 685 | 570 | 58 | 7.2 | 3,120 | 7.9 |
| Aug. 8-10 | 365 | -- | -- | 196 | 59 | 605 | | 46 | 620 | 960 | -- | 12 | | 2,580 | 3.51 | 2,540 | 730 | 692 | 64 | 9.7 | 3,940 | 7.3 |
| Aug. 11-19 | 470 | -- | -- | 196 | 50 | 605 | | 70 | 544 | 980 | -- | 6.3 | | 2,530 | 3.44 | 3,210 | 695 | 638 | 65 | 10 | 3,970 | 7.4 |
| Aug. 20-21 | 474 | -- | -- | 320 | 64 | 1,020 | | 124 | 863 | 1,620 | -- | -- | | 4,120 | 5.60 | 5,270 | 1,060 | 958 | 68 | 14 | 6,240 | 7.8 |
| Aug. 22-31 | 752 | -- | -- | 260 | 51 | 739 | | 132 | 666 | 1,180 | -- | -- | | 3,090 | 4.20 | 6,270 | 860 | 752 | 65 | 11 | 4,780 | 7.9 |
| Sept. 1-20 | 502 | 14 | 0.00 | 268 | 68 | 905 | 11 | 120 | 753 | 1,400 | 0.5 | -- | | 3,510 | 4.77 | 4,760 | 950 | 852 | 67 | 13 | 5,370 | 7.3 |
| Sept. 21-25 | 273 | -- | -- | 214 | 60 | 679 | | 124 | 580 | 1,100 | -- | -- | | 2,820 | 3.84 | 2,080 | 780 | 678 | 65 | 11 | 4,380 | 8.0 |
| Sept. 26-30 | 1,370 | -- | -- | 121 | 34 | 371 | | 112 | 295 | 600 | -- | 2.2 | | 1,520 | 2.07 | 5,620 | 440 | 348 | 65 | 7.7 | 2,480 | 8.0 |
| Weighted average | 2,916 | -- | -- | 147 | 36 | 364 | | 144 | 342 | 590 | -- | -- | | 1,660 | 2.26 | 13,070 | 515 | 397 | 61 | 7.0 | 2,590 | -- |

a Includes equivalent of 4 parts per million carbonate ($CO_3$).
c Includes equivalent of 8 parts per million carbonate ($CO_3$).

## 3316. RED RIVER AT DENISON DAM NEAR DENISON, TEX.

LOCATION.--Immediately below Denison Dam, 1.7 miles upstream from Sand Creek, 4 miles northwest of Denison, Grayson County, and 3 miles upstream from gaging station near Colbert, Bryan County, Okla.
DRAINAGE AREA.--39,719 square miles above dam, 39,777 square miles above gaging station, of which 5,936 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: May 1944 to September 1960.
Water temperatures: October 1945 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,160 ppm Sept. 1-30; minimum, 900 ppm May 1-31.
Hardness: Maximum, 398 ppm Aug. 1-31; minimum, 312 ppm Feb. 1-29.
Specific conductance: Maximum daily, 1,990 micromhos Oct. 23; minimum daily, 1,490 micromhos Feb. 16-19, May 25.
EXTREMES, 1944-60.--Dissolved solids: Maximum, 1,430 ppm Aug. 11-20, Sept. 1-10, 1944; minimum, 464 ppm Oct. 21-31, 1945.
Hardness: Maximum, 522 ppm Aug. 11-20, Sept. 1-10, 1944; minimum, 233 ppm Dec. 21-31, 1945, Jan. 11-20, 1946.
Specific conductance: Maximum daily, 3,520 micromhos Aug. 14, 1944; minimum daily, 656 micromhos Oct. 16, 1945.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Colbert, Okla. for water year October 1959 to September 1960 given in Water-Supply Paper 1711. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1-31, 1959 | 15,990 | 10 | | 108 | 29 | 250 | 6.1 | 116 | 255 | 405 | 0.4 | 1.5 | | 1,120 | 1.52 | 48,350 | 388 | 294 | 58 | 5.5 | 1,940 | 7.5 |
| Nov. 1-30 | 2,600 | 9.6 | | 102 | 29 | 243 | | 117 | 264 | 375 | -- | 1.0 | | 1,080 | 1.47 | 7,580 | 374 | 278 | 59 | 5.5 | 1,830 | 7.6 |
| Dec. 1-31 | 6,739 | 8.8 | | 99 | 27 | 219 | | 114 | 247 | 342 | .3 | 1.2 | | 1,000 | 1.36 | 18,200 | 358 | 264 | 57 | 5.0 | 1,720 | 7.5 |
| Jan. 1-31, 1960 | 7,904 | 9.6 | | 94 | 22 | 210 | | 122 | 222 | 318 | .4 | .8 | | 962 | 1.31 | 20,530 | 325 | 225 | 58 | 5.1 | 1,570 | 7.5 |
| Feb. 1-29 | 7,468 | 8.8 | | 89 | 22 | 198 | | 124 | 220 | 290 | .3 | 4.2 | | 929 | 1.26 | 18,730 | 312 | 211 | 58 | 4.9 | 1,510 | 7.4 |
| Mar. 1-31 | 4,149 | 8.6 | | 94 | 22 | 198 | | 134 | 211 | 300 | .5 | 1.2 | | 971 | 1.32 | 10,880 | 325 | 215 | 57 | 4.8 | 1,560 | 7.5 |
| Apr. 1-30 | 3,216 | 7.8 | | 96 | 28 | 185 | | 145 | 214 | 292 | .4 | 1.8 | | 932 | 1.27 | 8,090 | 354 | 236 | 53 | 4.3 | 1,550 | 7.6 |
| May 1-31 | 2,703 | 8.6 | | 99 | 25 | 187 | | 155 | 223 | 280 | .3 | 1.0 | | a900 | 1.22 | 6,570 | 350 | 223 | 54 | 4.3 | 1,530 | 7.5 |
| June 1-30 | 3,575 | 11 | | 100 | 28 | 188 | | 160 | 222 | 290 | .3 | 1.5 | | 971 | 1.32 | 9,370 | 364 | 234 | 53 | 4.3 | 1,560 | 7.4 |
| July 1-31 | 3,785 | 10 | | 106 | 29 | 220 | | 153 | 243 | 342 | .3 | 1.5 | | 1,030 | 1.40 | 10,530 | 384 | 258 | 56 | 4.9 | 1,740 | 7.7 |
| Aug. 1-31 | 2,217 | 11 | | 110 | 30 | 243 | | 157 | 256 | 375 | .4 | 1.5 | | 1,100 | 1.50 | 6,580 | 398 | 270 | 57 | 5.3 | 1,840 | 7.5 |
| Sept. 1-30 | 1,930 | 12 | | 113 | 28 | 264 | | 153 | 266 | 400 | .6 | 2.5 | | 1,160 | 1.58 | 6,040 | 397 | 272 | 59 | 5.8 | 1,960 | 7.5 |
| Weighted average | 5,203 | 9.5 | | 101 | 26 | 222 | | 129 | 238 | 343 | 0.4 | 1.7 | | 1,020 | 1.39 | 14,330 | 359 | 254 | 57 | 5.1 | 1,710 | -- |

a Calculated from determined constituents.

## 3425. SOUTH SULPHUR RIVER NEAR COOPER, TEX.

LOCATION.--At gaging station at bridge on State Highway 154, 0.6 mile downstream from Big Creek, 1.0 mile upstream from Brushy Creek, and 5.7 miles southeast of Cooper, Delta County.
DRAINAGE AREA.--527 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1958 to September 1960.
Water temperatures: October 1958 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,120 ppm Nov. 1; minimum, 85 ppm July 25.
Hardness: Maximum, 326 ppm Apr. 21-30; minimum, 48 ppm July 25.
Specific conductance: Maximum daily, 2,040 micromhos Nov. 1; minimum daily, 136 micromhos June 26.
Water temperatures: Maximum, 97°F Aug. 6; minimum, 40°F Mar. 2, 4.
EXTREMES, 1958-60.--Dissolved solids: Maximum, 1,120 ppm Nov. 1, 1959; minimum, 85 ppm July 25, 1960.
Hardness: Maximum, 326 ppm Apr. 21-30, 1960; minimum, 48 ppm July 25, 1960.
Specific conductance: Maximum daily, 2,040 micromhos Nov. 1, 1959; minimum daily, 136 micromhos June 26, 1960.
Water temperatures: Maximum, 97°F Aug. 6, 1960; minimum, 40°F Mar. 2, 4, 1960.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1711.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-10, 1959 | 943 | 13 | | 26 | 2.8 | 12 | 4.4 | 93 | 17 | 6.8 | 0.4 | 3.0 | | 131 | 0.18 | 334 | 76 | 0 | 24 | 0.6 | 214 | 7.2 |
| Oct. 11-20 | 121 | 16 | | 34 | 3.5 | 20 | | 123 | 23 | 12 | .4 | 1.2 | | 170 | .23 | 55.5 | 99 | 0 | 31 | .9 | 283 | 7.3 |
| Oct. 21-31 | 1.58 | 13 | | 44 | 4.5 | 23 | | 160 | 27 | 12 | .4 | .5 | | a222 | .30 | .95 | 128 | 0 | 28 | .9 | 341 | 7.4 |
| Nov. 1 | 19.0 | 16 | | 88 | 9.1 | 328 | | 182 | 36 | 555 | -- | 2.2 | | 1,120 | 1.52 | 57.5 | 257 | 108 | 74 | 8.9 | 2,040 | 8.2 |
| Nov. 2-3 | 13.8 | 18 | | 46 | 5.5 | 48 | | 175 | 27 | 48 | .3 | .8 | | 280 | .38 | 10.4 | 137 | 0 | 43 | 1.8 | 477 | 8.2 |
| Nov. 4-7 | 2,204 | 11 | | 22 | 2.7 | 14 | | 82 | 16 | 7.0 | .2 | 2.0 | | 115 | .16 | 684 | 66 | 0 | 31 | .7 | 195 | 7.3 |
| Nov. 8-14 | 31.1 | 13 | | 40 | 4.4 | 23 | | 145 | 23 | 16 | .2 | 1.5 | | 192 | .26 | 16.1 | 118 | 0 | 29 | .9 | 328 | 7.6 |
| Nov. 15-30 | 8.77 | 14 | | 66 | 6.5 | 52 | | 229 | 49 | 46 | .2 | .8 | | a365 | .50 | 8.64 | 191 | 4 | 37 | 1.6 | 595 | 7.4 |
| Dec. 1-11 | 2.52 | 16 | | 80 | 8.7 | 46 | | 289 | 46 | 35 | .3 | .8 | | a398 | .54 | 2.71 | 236 | 0 | 30 | 1.3 | 625 | 7.9 |
| Dec. 12 | 39.0 | -- | | -- | -- | -- | | 188 | -- | 164 | -- | -- | | -- | -- | -- | 169 | 15 | -- | -- | 913 | 8.2 |
| Dec. 13-15 | 293 | 13 | | 50 | 5.7 | 39 | | 168 | 34 | 38 | .4 | 6.0 | | 269 | .37 | 213 | 148 | 10 | 36 | 1.4 | 455 | 8.0 |
| Dec. 16-18 | 8,920 | 10 | | 21 | 1.5 | 13 | | 70 | 15 | 6.0 | .4 | 4.5 | | 105 | .14 | 2,530 | 59 | 1 | 32 | .7 | 171 | 7.0 |
| Dec. 19-31 | 486 | 13 | | 47 | 4.9 | 28 | | 155 | 37 | 22 | .4 | 2.2 | | a249 | .34 | 327 | 137 | 10 | 31 | 1.0 | 381 | 7.0 |
| Jan. 1-5, 17-19, 1960 | 1,160 | 9.4 | | 28 | 3.5 | 14 | | 97 | 20 | 7.5 | .4 | 2.2 | | 133 | .18 | 417 | 84 | 5 | 26 | .7 | 230 | 7.3 |
| Jan. 6-9 | 3,396 | 9.4 | | 19 | 2.4 | 12 | | 75 | 13 | 4.0 | .6 | 1.0 | | 98 | .13 | 899 | 57 | 0 | 31 | .7 | 164 | 7.4 |
| Jan. 10-16 | 241 | 10 | | 46 | 5.5 | 28 | | 158 | 38 | 18 | .4 | 2.2 | | a237 | .32 | 154 | 137 | 8 | 30 | 1.0 | 386 | 7.5 |
| Jan. 20-31 | 38.8 | 13 | | 68 | 8.1 | 37 | | 235 | 44 | 30 | .3 | 2.2 | | a325 | .44 | 34.0 | 203 | 10 | 29 | 1.1 | 540 | 7.6 |
| Feb. 1-3 | 42.0 | 11 | | 97 | 11 | 80 | | 323 | 72 | 84 | .5 | 1.5 | | 516 | .70 | 58.5 | 287 | 22 | 38 | 2.1 | 879 | 7.9 |
| Feb. 4-7 | 1,653 | 11 | | 30 | 3.4 | 17 | | 102 | 26 | 8.5 | .5 | 3.2 | | 150 | .20 | 669 | 89 | 5 | 30 | .8 | 252 | 7.6 |
| Feb. 8-23 | 43.7 | 8.8 | | 75 | 8.8 | 43 | | 251 | 61 | 32 | .4 | 2.2 | | a372 | .51 | 43.9 | 223 | 18 | 30 | 1.3 | 604 | 7.7 |
| Feb. 24-29 | 146 | 7.8 | | 42 | 5.5 | 31 | | 137 | 46 | 23 | .4 | .8 | | 224 | .30 | 88.3 | 127 | 15 | 34 | 1.2 | 384 | 7.4 |
| Mar. 1-7 | 336 | 9.6 | | 36 | 4.3 | 22 | | 118 | 36 | 14 | .3 | 1.5 | | 182 | .25 | 165 | 108 | 11 | 31 | .9 | 309 | 7.2 |
| Mar. 8-14 | 37.9 | 9.6 | | 64 | 7.9 | 45 | | 210 | 61 | 37 | .3 | 1.5 | | a336 | .46 | 34.4 | 192 | 20 | 34 | 1.4 | 551 | 7.3 |
| Mar. 15-19 | 312 | 9.2 | | 42 | 5.2 | 26 | | 130 | 46 | 18 | .4 | 1.5 | | 212 | .29 | 179 | 126 | 20 | 31 | 1.0 | 358 | 7.4 |
| Mar. 20-31 | 106 | 9.0 | | 60 | 7.1 | 39 | | 188 | 62 | 31 | .3 | 1.5 | | a322 | .44 | 92.2 | 178 | 24 | 32 | 1.3 | 511 | 7.3 |
| Apr. 1-10 | 8.12 | 9.2 | | 76 | 9.2 | 48 | 3.7 | 251 | 71 | 41 | .5 | .8 | | a389 | .53 | 8.53 | 228 | 22 | 31 | 1.4 | 628 | 8.0 |
| Apr. 11-20 | 4.03 | 9.8 | | 94 | 12 | 65 | | 326 | 76 | 55 | .5 | .5 | | a480 | .65 | 5.22 | 284 | 17 | 33 | 1.7 | 784 | 7.9 |
| Apr. 21-30 | 101 | 9.0 | | 109 | 13 | 80 | | 370 | 88 | 74 | .5 | .2 | | a561 | .76 | 153 | 326 | 22 | 35 | 1.9 | 912 | 7.7 |
| May 1-3, 6-8 | 1,154 | 8.0 | | 28 | 2.4 | 15 | | 96 | 18 | 7.0 | .5 | 3.8 | | 130 | .18 | 405 | 80 | 1 | 29 | .7 | 217 | 7.0 |
| May 4-5, 9-12 | 86.7 | 12 | | 42 | 4.3 | 19 | | 143 | 26 | 12 | .4 | 3.0 | | a196 | .27 | 45.9 | 122 | 5 | 26 | .7 | 321 | 7.4 |
| May 13-25 | 4.17 | 12 | | 68 | 7.3 | 38 | | 238 | 35 | 35 | .4 | 1.5 | | a318 | .43 | 3.58 | 200 | 4 | 30 | 1.2 | 532 | 7.7 |
| May 26-31 | 89.5 | 8.2 | | 35 | 2.7 | 24 | | 120 | 26 | 15 | .5 | 4.0 | | a184 | .25 | 44.5 | 98 | 0 | 35 | 1.1 | 298 | 7.1 |

a Residue on evaporation at 180°C.

3425. SOUTH SULPHUR RIVER NEAR COOPER, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| June 1-12, 1960 | 196 | 12 | | 34 | 2.2 | 18 | | 113 | 19 | 10 | 0.6 | 6.9 | | a160 | 0.22 | 84.7 | 94 | 1 | 30 | 0.8 | 272 | 6.8 |
| June 13-14, 26-28 | 1,728 | 11 | | 22 | 2.1 | 10 | | 74 | 13 | 5.0 | .4 | 4.2 | | 104 | .14 | 485 | 64 | 3 | 26 | .5 | 180 | 6.6 |
| June 15-25, 29-30 | 41.1 | 12 | | 42 | 4.2 | 19 | | 144 | 24 | 12 | .5 | 2.2 | | a194 | .26 | 21.5 | 122 | 4 | 25 | .7 | 325 | 7.0 |
| July 1-4 | 10.0 | 23 | | 36 | 3.8 | 18 | | 132 | 16 | 12 | .4 | 3.5 | | 178 | .24 | 4.81 | 105 | 0 | 28 | .8 | 266 | 7.7 |
| July 5-6, 16-17 | 933 | 11 | | 23 | 2.2 | 10 | | 80 | 12 | 4.5 | .5 | 3.5 | | 106 | .14 | 267 | 66 | 1 | 25 | .5 | 174 | 7.0 |
| July 7-15, 18-24 | 70.4 | 13 | | 36 | 3.6 | 16 | | 129 | 17 | 9.5 | .4 | 1.8 | | a175 | .24 | 33.3 | 105 | 0 | 25 | .7 | 265 | 7.3 |
| July 25 | 489 | -- | | -- | -- | -- | | 62 | -- | 4.2 | -- | -- | | 85 | .12 | 112 | 48 | 0 | -- | -- | 139 | 6.8 |
| July 26-31 | 83.2 | 9.0 | | 21 | 2.5 | 10 | | 73 | 12 | 7.2 | .4 | 2.0 | | 100 | .14 | 22.5 | 63 | 3 | 26 | .5 | 174 | 6.6 |
| Aug. 1-11 | 1.72 | 14 | | 29 | 3.2 | 15 | | 108 | 14 | 8.8 | .4 | 1.2 | | 139 | .19 | .65 | 86 | 0 | 27 | .7 | 229 | 7.1 |
| Aug. 12-22 | 50.7 | 13 | | 32 | 3.3 | 27 | | 119 | 27 | 17 | .6 | 2.0 | | a197 | .27 | 27.0 | 93 | 0 | 39 | 1.2 | 302 | 7 3 |
| Aug. 23-31 | 27.6 | 10 | | 31 | 2.8 | 19 | | 112 | 20 | 11 | .5 | 1.8 | | 151 | .21 | 11.3 | 89 | 0 | 32 | .9 | 258 | 7.0 |
| Sept. 1-12 | b .13 | 15 | | 42 | 4.4 | 24 | | 155 | 25 | 14 | .5 | 1.2 | | 202 | .27 | .07 | 123 | 0 | 30 | .9 | 345 | 7.2 |
| Sept. 13-26 | b10.5 | 13 | | 45 | 5.0 | 38 | | 164 | 33 | 30 | .5 | 3.8 | | a265 | .36 | 7.51 | 133 | 0 | 38 | 1.4 | 422 | 7.3 |
| Sept. 27-30 | 961 | 13 | | 28 | 2.8 | 21 | | 106 | 20 | 10 | .6 | 4.8 | | 152 | .21 | 394 | 81 | 0 | 36 | 1.0 | 255 | 7.1 |
| Weighted average | 339 | 11 | | 28 | 2.9 | 17 | | 98 | 21 | 9.7 | 0.4 | 3.1 | | 143 | 0.19 | 131 | 82 | 1 | 31 | 0.8 | 236 | -- |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.

MISCELLANEOUS ANALYSES OF STREAMS IN RED RIVER BASIN IN TEXAS

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| **2997. GROESBECK CREEK NEAR QUANAH** | | | | | | | | | | | | | | | | | | | | | | |
| Sept. 7, 1960--------- | 3.32 | 18 | | 450 | 83 | 209 | | 133 | 1,330 | 298 | 0.3 | 2.8 | | 2,460 | 3.35 | | 1,460 | 1,350 | 24 | 2.4 | 3,030 | 7.7 |
| **2997.5 WANDERERS CREEK AT ODELL** | | | | | | | | | | | | | | | | | | | | | | |
| Sept. 6, 1960--------- | 1.08 | 28 | | 55 | 36 | 80 | | 228 | 138 | 64 | 0.6 | 21 | | 555 | 0.75 | | 285 | 98 | 38 | 2.1 | 860 | 7.9 |
| **2998.5. SALT FORK RED RIVER NEAR CLARENDON** | | | | | | | | | | | | | | | | | | | | | | |
| May 19, 1960---------- | | 26 | | 61 | 13 | 42 | | 205 | 68 | 38 | 0.7 | 2.0 | | 352 | 0.48 | | 206 | 38 | 31 | 1.3 | 557 | 7.9 |
| June 2, 15, 23-------- | | 30 | | 61 | 17 | 44 | | 191 | 93 | 43 | .8 | 1.5 | | a405 | .55 | | 222 | 66 | 30 | 1.3 | 609 | 7.6 |
| June 7, 9, 10--------- | | 18 | | 39 | 6.6 | 18 | | 136 | 25 | 16 | .5 | 3.5 | | a196 | .27 | | 124 | 13 | 24 | .7 | 311 | 7.7 |
| July 3, 10------------ | | -- | | -- | -- | -- | | 172 | -- | 62 | -- | -- | | -- | -- | | 224 | 83 | -- | -- | 691 | 7.7 |
| July 6, 14, 20, 27---- | | 34 | | 56 | 18 | 30 | | 174 | 106 | 46 | 1.0 | 1.2 | | a416 | .57 | | 214 | 71 | 34 | 1.5 | 615 | 7.6 |
| Aug. 18---------- | | -- | | -- | -- | -- | | 140 | 23 | 10 | -- | -- | | -- | -- | | 120 | 6 | -- | -- | 296 | 7.3 |
| Aug. 24---------- | | -- | | -- | -- | -- | | 158 | 107 | 54 | -- | -- | | -- | -- | | 198 | 68 | -- | -- | 638 | 7.9 |
| **2999.5. DOZIER CREEK NEAR WELLINGTON** | | | | | | | | | | | | | | | | | | | | | | |
| Jan. 15, 1960--------- | 0.48 | | | | | | | 58 | | 38 | | | | | | | 608 | 560 | | | 1,160 | 7.4 |
| **LAKE OLNEY NEAR OLNEY** | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 22, 1960--------- | | 2.3 | 0.10 | 46 | 13 | 83 | 4.8 | 151 | 10 | 151 | 0.6 | 0.8 | 0.09 | a411 | 0.56 | | 168 | 45 | 51 | 2.8 | 734 | 7.6 |
| **DRY FORK LITTLE WICHITA RIVER AT U. S. HIGHWAY 82, 1½ MILES EAST OF HENRIETTA** | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 4, 1959---------- | | 12 | | 9.1 | 1.8 | 7.8 | | 44 | 0.8 | 6.5 | 0.1 | 0.8 | | 61 | 0.08 | | 30 | 0 | 36 | 0.6 | 87 | 7.6 |
| Oct. 7---------- | | 18 | | 16 | 3.7 | 18 | | 78 | 5.8 | 16 | .1 | 1.0 | | 117 | .16 | | 54 | 0 | 42 | 1.1 | 182 | 7.9 |
| **EAST FORK LITTLE WICHITA RIVER AT U. S. HIGHWAY 82, 6 MILES EAST OF HENRIETTA** | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 4, 1959---------- | | 11 | | 6.5 | 1.9 | 8.9 | | 34 | 0.8 | 10 | 0.0 | 0.8 | | 57 | 0.08 | | 24 | 0 | 45 | 0.8 | 85 | 7.3 |
| Oct. 7---------- | | 16 | | 14 | 3.4 | 18 | | 66 | 3.2 | 22 | .2 | .5 | | 109 | .15 | | 50 | 0 | 44 | 1.1 | 176 | 8.1 |

a Residue on evaporation at 180°C.

MISCELLANEOUS ANALYSES OF STREAMS IN RED RIVER BASIN IN TEXAS--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| LITTLE WICHITA RIVER AT MOUTH NEAR RINGGOLD | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 4, 1959 | | 11 | | 11 | 3.2 | 24 | | 48 | 2.2 | 32 | 0.1 | 7.2 | | 115 | 0.16 | | 40 | 1 | 57 | 1.6 | 189 | 7.4 |
| Oct. 7 | | 12 | | 13 | 3.0 | 24 | | 56 | 3.2 | 33 | .1 | 1.5 | | 118 | .16 | | 46 | 0 | 53 | 1.5 | 201 | 7.9 |
| LAKE CROOK NEAR PARIS | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 18, 1960 | | 3.2 | | 14 | 1.3 | 6.3 | 2.9 | 35 | 19 | 6.0 | 0.3 | 0.2 | | 70 | 0.10 | | 40 | 12 | 24 | 0.4 | 118 | 6.7 |
| SULPHUR RIVER AT STATE HIGHWAY 26 NORTH OF OMAHA | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 18, 1960 | | 6.8 | | 41 | 4.0 | 22 | | 115 | 45 | 17 | 0.2 | 0.8 | | 194 | 0.26 | | 119 | 24 | 29 | 0.9 | 324 | 7.2 |
| WHITE OAK CREEK AT STATE HIGHWAY 26 NEAR OMAHA | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 18, 1960 | | 6.4 | | 14 | 5.9 | 42 | | 27 | 58 | 48 | 0.1 | 0.2 | | 188 | 0.26 | | 59 | 37 | 61 | 2.4 | 323 | 6.5 |

## 220. SABINE RIVER NEAR TATUM, TEX.

LOCATION.--At gaging station at bridge on State Highway 43, 5 miles upstream from Potter Creek, 5.2 miles northeast of Tatum, Rusk County, 7 miles downstream from Cherokee Bayou, and at mile 339.
DRAINAGE AREA.--3,586 square miles.
RECORDS AVAILABLE.--Chemical analyses: February 1952 to September 1960.
Water temperatures: February 1952 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 513 ppm Aug. 17, 19-21; minimum, 96 ppm Oct. 12-21.
Hardness: Maximum, 96 ppm July 1-3, 9-11; minimum, 30 ppm Dec. 21-25, 27-31.
Specific conductance: Maximum daily, 1,020 micromhos Oct. 1; minimum daily, 127 micromhos Oct. 14.
Water temperatures: Maximum, 91°F on several days during August and September; minimum, 40°F Mar. 1.
EXTREMES, 1952-60.--Dissolved solids: Maximum, 936 ppm Aug. 21-31, 1956; minimum, 74 ppm Apr. 24-30, 1957.
Hardness: Maximum, 121 ppm Oct. 20, 1958; minimum, 22 ppm Apr. 24-30, 1957.
Specific conductance: Maximum daily, 1,850 micromhos Oct. 25, 1954, Aug. 31, 1956; minimum daily, 98 micromhos Apr. 29, 1957.
Water temperatures: Maximum, 98°F Aug. 13, 1956; minimum, 40°F Jan. 6, 1959, Mar. 1, 1960.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-4, 1959 | 213 | 18 | | 16 | 6.6 | 146 | 4.2 | 41 | 21 | 240 | -- | 1.8 | | 474 | 0.64 | 273 | 67 | 34 | 81 | 7.8 | 912 | 6.8 |
| Oct. 5-11 | 752 | 18 | | 12 | 4.9 | 77 | | 36 | 15 | 121 | -- | 1.8 | | a292 | .40 | 593 | 50 | 21 | 77 | 4.7 | 508 | 6.8 |
| Oct. 12-21 | 4,298 | 14 | | 10 | 2.9 | 17 | | 46 | 10 | 18 | -- | 1.2 | | 96 | .13 | 1,110 | 37 | 0 | 51 | 1.2 | 160 | 6.8 |
| Oct. 22-26 | 3,780 | 14 | | 16 | 3.9 | 30 | | 58 | 15 | 40 | -- | 1.2 | | 149 | .20 | 1,520 | 56 | 8 | 54 | 1.7 | 261 | 6.8 |
| Oct. 27-31 | 516 | 19 | | 20 | 4.4 | 52 | | 63 | 20 | 77 | -- | 1.2 | | 225 | .31 | 313 | 68 | 16 | 63 | 2.7 | 412 | 7.5 |
| Nov. 1-9 | 762 | 20 | | 19 | 4.9 | 78 | | 50 | 24 | 121 | -- | 1.2 | | a306 | .42 | 630 | 68 | 27 | 72 | 4.1 | 544 | 7.0 |
| Nov. 10-21 | 1,441 | 16 | | 17 | 3.3 | 47 | | 50 | 23 | 66 | -- | 1.0 | | 198 | .27 | 770 | 56 | 15 | 65 | 2.7 | 359 | 7.5 |
| Nov. 22-30 | 512 | 20 | | 18 | 4.8 | 76 | | 50 | 23 | 116 | -- | 1.2 | | a306 | .42 | 423 | 65 | 24 | 72 | 4.1 | 524 | 7.3 |
| Dec. 1-14 | 607 | 22 | | 17 | 6.0 | 101 | | 40 | 27 | 159 | -- | 1.0 | | a368 | .50 | 603 | 67 | 34 | 77 | 5.4 | 654 | 6.5 |
| Dec. 15-20, 26 | 4,777 | 13 | | 10 | 3.5 | 43 | | 22 | 21 | 65 | -- | 1.0 | | 168 | .23 | 2,170 | 39 | 21 | 70 | 3.0 | 299 | 6.4 |
| Dec. 21-25, 27-31 | 8,821 | 9.6 | | 9.2 | 1.8 | 23 | | 30 | 15 | 28 | -- | .8 | | 102 | .14 | 2,430 | 30 | 6 | 62 | 1.8 | 174 | 6.4 |
| Jan. 1, 7-8, 1960 | 9,153 | 11 | | 11 | 3.1 | 24 | | 29 | 19 | 34 | -- | 1.5 | | 118 | .16 | 2,920 | 40 | 16 | 57 | 1.6 | 208 | 6.8 |
| Jan. 2-6, 9-11 | 8,965 | 13 | | 14 | 4.3 | 35 | | 29 | 27 | 55 | -- | .2 | | 162 | .22 | 3,920 | 53 | 29 | 59 | 2.1 | 294 | 6.6 |
| Jan. 12-21 | 9,154 | 11 | | 11 | 3.2 | 27 | | 29 | 20 | 38 | -- | .2 | | 124 | .17 | 3,060 | 41 | 17 | 59 | 1.8 | 225 | 6.5 |
| Jan. 22-31 | 10,920 | 11 | | 12 | 3.8 | 28 | | 30 | 23 | 41 | -- | .2 | | 134 | .18 | 3,950 | 46 | 21 | 57 | 1.8 | 241 | 6.3 |
| Feb. 1-14 | 4,281 | 13 | | 16 | 5.7 | -- | | 25 | 37 | -- | 0.1 | .5 | | -- | -- | -- | -- | -- | -- | -- | 367 | -- |
| Feb. 15-24 | 4,820 | 11 | | 16 | 3.8 | 28 | | 39 | 27 | 39 | .2 | .8 | | 145 | .20 | 1,890 | 56 | 24 | 52 | 1.6 | 249 | 6.9 |
| Feb. 25-29 | 5,306 | 14 | | 14 | 4.9 | 44 | | 26 | 31 | 68 | .1 | .5 | | 190 | .26 | 2,720 | 55 | 34 | 63 | 2.6 | 340 | 6.9 |
| Mar. 1-14 | 6,671 | 11 | | 13 | 4.7 | 37 | | 22 | 33 | 55 | .2 | .8 | | 166 | .23 | 2,990 | 52 | 34 | 61 | 2.2 | 296 | 6.6 |
| Mar. 15-24 | 2,751 | 14 | | 16 | 6.2 | 59 | | 24 | 43 | 91 | .1 | .5 | | a266 | .36 | 1,980 | 65 | 46 | 66 | 3.2 | 434 | 6.7 |
| Mar. 25-31 | 2,227 | 14 | | 16 | 6.2 | 53 | | 22 | 39 | 86 | .1 | .8 | | a248 | .34 | 1,490 | 65 | 47 | 64 | 2.9 | 409 | 6.5 |
| Apr. 1-10 | 1,150 | 16 | | 17 | 7.6 | 62 | 2.5 | 26 | 42 | 106 | -- | .5 | | a286 | .39 | 888 | 74 | 52 | 64 | 3.1 | 502 | 6.5 |
| Apr. 11-20 | 763 | 14 | | 17 | 7.7 | 68 | | 30 | 39 | 111 | -- | .5 | | a292 | .40 | 602 | 74 | 49 | 67 | 3.4 | 520 | 6.6 |
| Apr. 21-30 | 639 | 15 | | 16 | 7.1 | 74 | | 29 | 34 | 121 | -- | .5 | | a301 | .41 | 519 | 69 | 45 | 70 | 3.9 | 539 | 6.5 |
| May 1-9 | 899 | 15 | | 20 | 8.1 | 92 | | 36 | 41 | 150 | -- | 1.2 | | a360 | .49 | 874 | 84 | 54 | 71 | 4.4 | 653 | 7.0 |
| May 10-12, 15 | 1,410 | 13 | | 22 | 4.3 | 26 | | 75 | 21 | 32 | -- | 1.8 | | 157 | .21 | 598 | 73 | 11 | 44 | 1.3 | 281 | 7.3 |
| May 13-14, 16-17 | 1,560 | 11 | | 25 | 7.4 | 61 | | 64 | 46 | 87 | -- | 1.8 | | 270 | .37 | 1,140 | 93 | 40 | 59 | 2.8 | 503 | 7.0 |
| May 18-31 | 663 | 14 | | 18 | 4.9 | 51 | | 51 | 23 | 78 | -- | 1.5 | | a232 | .32 | 415 | 65 | 23 | 63 | 2.7 | 404 | 7.0 |
| June 1-6 | 282 | 17 | | 18 | 6.4 | 76 | | 56 | 28 | 113 | -- | 2.0 | | a298 | .41 | 227 | 71 | 25 | 70 | 4.0 | 534 | 7.1 |
| June 7-18 | 748 | 14 | | 14 | 3.7 | 43 | | 46 | 19 | 61 | -- | 1.5 | | 179 | .24 | 362 | 50 | 12 | 65 | 2.6 | 331 | 6.8 |
| June 19-20 | 752 | -- | | -- | -- | -- | | 45 | -- | 147 | -- | -- | | -- | -- | -- | 66 | 29 | -- | -- | 609 | 6.8 |
| June 21-30 | 776 | 12 | | 12 | 3.7 | 41 | | 29 | 21 | 62 | -- | 1.0 | | 167 | .23 | 350 | 45 | 21 | 66 | 2.7 | 315 | 6.4 |
| July 1-3, 9-11 | 1,224 | 14 | | 25 | 8.3 | 126 | | 34 | 29 | 220 | -- | 2.0 | | 441 | .60 | 1,460 | 96 | 68 | 74 | 5.6 | 842 | 6.6 |
| July 4-8 | 1,988 | 26 | | 14 | 3.9 | 40 | | 47 | 21 | 54 | -- | 2.0 | | 184 | .25 | 988 | 51 | 12 | 63 | 2.4 | 313 | 6.6 |
| July 12-31 | 667 | 13 | | 17 | 4.3 | 47 | | 54 | 18 | 69 | -- | 2.0 | | 197 | .27 | 355 | 60 | 16 | 63 | 2.6 | 366 | 6.6 |
| Aug. 1-16 | 164 | 19 | | 23 | 5.8 | 69 | | 85 | 18 | 100 | -- | 1.0 | | a292 | .40 | 129 | 81 | 12 | 65 | 3.3 | 511 | 7.2 |
| Aug. 17, 19-21 | 124 | 17 | | 23 | 7.0 | 159 | | 67 | 20 | 251 | -- | 2.8 | | 513 | .70 | 172 | 86 | 32 | 80 | 7.5 | 957 | 7.2 |
| Aug. 18, 22, 29 | 254 | 15 | | 14 | 4.0 | 52 | | 36 | 22 | 79 | -- | 2.0 | | 206 | .28 | 141 | 51 | 22 | 69 | 3.2 | 374 | 7.0 |
| Aug. 23-28, 30-31 | 470 | 15 | | 19 | 5.0 | 87 | | 57 | 22 | 133 | -- | 1.2 | | a339 | .46 | 430 | 68 | 22 | 74 | 4.6 | 576 | 6.7 |
| Sept. 1-10 | 241 | 13 | | 15 | 5.1 | 96 | | 46 | 25 | 144 | -- | 1.0 | | a348 | .47 | 226 | 58 | 21 | 78 | 5.5 | 619 | 6.9 |
| Sept. 11-21 | 108 | 10 | | 16 | 5.5 | 95 | | 63 | 24 | 135 | -- | 1.2 | | a325 | .44 | 94.8 | 62 | 11 | 77 | 5.2 | 599 | 6.9 |
| Sept. 22-30 | 859 | 10 | | 9.0 | 3.1 | 53 | | 23 | 16 | 81 | -- | 1.5 | | 185 | .25 | 429 | 35 | 16 | 77 | 3.9 | 348 | 6.5 |
| Weighted average | 2,527 | 13 | | 13 | 4.1 | 39 | | 32 | 25 | 57 | -- | 0.7 | | 170 | 0.23 | 1,160 | 49 | 23 | 63 | 2.4 | 303 | -- |

a Residue on evaporation at 180°C.

## 305. SABINE RIVER NEAR RULIFF, TEX.

LOCATION.--At gaging station at bridge on State Highway 12, 2.4 miles north of Ruliff, Newton County, 4.2 miles upstream from Kansas City Southern Railway bridge, 4.5 miles downstream from Cypress Creek and at mile 40.
DRAINAGE AREA.--9,440 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1947 to September 1960.
Water temperatures: October 1947 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 217 ppm May 13-24; minimum, 72 ppm Dec. 16-31.
Hardness: Maximum, 62 ppm May 13-24; minimum, 23 ppm June 25-30.
Specific conductance: Maximum daily, 457 micromhos May 19, 21; minimum daily, 122 micromhos Dec. 26, 28.
Water temperatures: Maximum, 90°F July 11-12; minimum, 48°F on several days during February and March.
EXTREMES, 1945-46, 1947-60.--Dissolved solids: Maximum, 411 ppm Dec. 26-27, 1948; minimum, 32 ppm Sept. 23-26, 28-30, 1958.
Hardness: Maximum, 65 ppm Dec. 21-22, 1954; minimum, 8 ppm May 20-24, 1953.
Specific conductance: Maximum daily, 774 micromhos Dec. 26, 1948; minimum daily, 33 micromhos May 22, 1953.
Water temperatures (1947-60): Maximum, 95°F Aug. 12, 1953; minimum, 34°F Jan. 28, 1948.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-10, 1959-------- | 956 | 18 | | 9.8 | 3.1 | 37 | 2.8 | 41 | 9.2 | 56 | 0.1 | 0.8 | | a162 | 0.22 | 418 | 37 | 4 | 67 | 2.6 | 273 | 6.9 |
| Oct. 11-22-------- | 2,627 | 14 | | 8.0 | 2.6 | 40 | | 32 | 12 | 56 | -- | 1.2 | | 150 | .20 | 1,060 | 30 | 4 | 74 | 3.2 | 273 | 6.5 |
| Oct. 23-31-------- | 5,389 | 14 | | 10 | 2.3 | 18 | | 42 | 11 | 20 | -- | .8 | | 97 | .13 | 1,410 | 34 | 0 | 54 | 1.3 | 162 | 6.8 |
| Nov. 1-10-------- | 2,557 | 15 | | 12 | 4.0 | 31 | | 46 | 15 | 43 | -- | 1.2 | | 144 | .20 | 994 | 46 | 9 | 59 | 2.0 | 255 | 6.7 |
| Nov. 11-13-------- | 3,483 | 10 | | 7.0 | 3.2 | 17 | | 24 | 11 | 26 | -- | .8 | | 87 | .12 | 818 | 30 | 11 | 55 | 1.3 | 151 | 6.6 |
| Nov. 14-30-------- | 2,586 | 16 | | 13 | 4.4 | 34 | | 42 | 17 | 50 | -- | 1.2 | | 157 | .21 | 1,100 | 50 | 16 | 59 | 2.1 | 275 | 6.8 |
| Dec. 1-15-------- | 1,644 | 15 | | 8.5 | 3.4 | 29 | | 28 | 13 | 44 | -- | .5 | | a137 | .19 | 608 | 35 | 12 | 65 | 2.1 | 217 | 6.4 |
| Dec. 16-31-------- | 12,860 | 7.8 | | 7.5 | 2.1 | 14 | | 23 | 9.0 | 20 | -- | .8 | | 72 | .10 | 2,500 | 27 | 8 | 53 | 1.2 | 126 | 6.9 |
| Jan. 1-15, 1960-------- | 14,870 | 11 | | 8.8 | 3.6 | 23 | | 17 | 20 | 34 | -- | 4.5 | | 113 | .15 | 4,540 | 37 | 23 | 57 | 1.6 | 194 | 5.9 |
| Jan. 16-31-------- | 15,980 | 11 | | 8.8 | 3.4 | 21 | | 20 | 19 | 32 | -- | 1.2 | | 106 | .14 | 4,570 | 37 | 20 | 55 | 1.5 | 188 | 6.2 |
| Feb. 1-11-------- | 16,730 | 11 | | 9.0 | 2.8 | 23 | | 20 | 20 | 32 | .2 | .2 | | 108 | .15 | 4,880 | 34 | 18 | 59 | 1.7 | 186 | 6.3 |
| Feb. 12-17-------- | 14,330 | 12 | | 8.8 | 3.4 | 25 | | 18 | 22 | 37 | .1 | .5 | | 118 | .16 | 4,570 | 36 | 21 | 60 | 1.8 | 208 | 6.2 |
| Feb. 18-29-------- | 17,580 | 10 | | 6.8 | 2.5 | 19 | | 16 | 18 | 26 | .1 | 1.0 | | 91 | .12 | 4,320 | 28 | 14 | 60 | 1.6 | 153 | 6.1 |
| Mar. 1-15-------- | 20,910 | 9.6 | | 8.5 | 3.3 | 25 | | 13 | 24 | 36 | .1 | 1.8 | | 114 | .16 | 6,440 | 34 | 24 | 61 | 1.9 | 196 | 6.1 |
| Mar. 16-31-------- | 13,560 | 11 | | 9.0 | 3.7 | 25 | | 18 | 24 | 36 | .1 | 1.2 | | 119 | .16 | 4,360 | 38 | 22 | 59 | 1.8 | 204 | 6.4 |
| Apr. 1-10-------- | 7,880 | 12 | | 9.5 | 4.3 | 25 | 2.3 | 23 | 24 | 38 | -- | .8 | | 127 | .17 | 2,700 | 41 | 22 | 55 | 1.7 | 226 | 6.5 |
| Apr. 11-21-------- | 3,816 | 15 | | 11 | 5.5 | 36 | | 30 | 25 | 54 | -- | 1.0 | | a176 | .24 | 1,810 | 50 | 26 | 61 | 2.2 | 293 | 6.5 |
| Apr. 22-30-------- | 2,883 | 16 | | 12 | 5.7 | 39 | | 34 | 24 | 60 | -- | .5 | | a186 | .25 | 1,450 | 54 | 26 | 61 | 2.3 | 315 | 6.8 |
| May 1-12-------- | 4,585 | 12 | | 9.5 | 3.9 | 33 | | 26 | 21 | 47 | -- | 1.0 | | 140 | .19 | 1,730 | 40 | 18 | 64 | 2.3 | 253 | 6.3 |
| May 13-24-------- | 2,838 | 13 | | 15 | 5.8 | 50 | | 44 | 32 | 71 | -- | 1.0 | | a217 | .30 | 1,660 | 62 | 26 | 64 | 2.8 | 380 | 6.3 |
| May 25-31-------- | 2,307 | 14 | | 15 | 4.7 | 33 | | 52 | 21 | 45 | -- | 1.0 | | a172 | .23 | 1,070 | 57 | 14 | 56 | 1.9 | 286 | 6.4 |
| June 1-15-------- | 1,499 | 15 | | 13 | 4.4 | 30 | | 55 | 14 | 38 | .3 | 1.2 | | 143 | .19 | 579 | 50 | 6 | 56 | 1.8 | 243 | 6.8 |
| June 16-24-------- | 1,861 | 13 | | 12 | 4.5 | 56 | | 43 | 19 | 81 | .2 | .5 | | a214 | .29 | 1,080 | 48 | 14 | 71 | 3.5 | 375 | 6.8 |
| June 25-30-------- | 4,757 | 6.8 | | 6.0 | 1.9 | 24 | | 14 | 11 | 36 | .2 | 1.0 | | 94 | .13 | 1,210 | 23 | 12 | 70 | 2.2 | 164 | 6.2 |
| July 1-3, 8-10-------- | 4,560 | 10 | | 8.0 | 2.9 | 23 | | 26 | 12 | 34 | -- | 1.0 | | 104 | .14 | 1,280 | 32 | 10 | 61 | 1.8 | 188 | 6.4 |
| July 4-7-------- | 3,292 | 9.0 | | 6.5 | 2.2 | 18 | | 22 | 9.6 | 25 | -- | 1.2 | | 82 | .11 | 729 | 25 | 7 | 61 | 1.6 | 133 | 6.5 |
| July 11-20-------- | 3,052 | 11 | | 9.2 | 3.4 | 29 | | 34 | 12 | 42 | -- | .5 | | 124 | .17 | 1,020 | 37 | 9 | 63 | 2.1 | 216 | 6.5 |
| July 21-31-------- | 2,495 | 10 | | 12 | 4.5 | 39 | | 37 | 17 | 60 | -- | .5 | | a172 | .23 | 1,160 | 48 | 18 | 64 | 2.4 | 288 | 6.3 |
| Aug. 1-13-------- | 1,505 | 14 | | 13 | 3.9 | 47 | | 42 | 13 | 72 | -- | .5 | | a196 | .27 | 796 | 48 | 14 | 68 | 3.0 | 328 | 6.3 |
| Aug. 14-20-------- | 1,004 | 18 | | 12 | 3.5 | 34 | | 50 | 11 | 46 | -- | .5 | | a160 | .22 | 434 | 44 | 4 | 62 | 2.2 | 249 | 6.4 |
| Aug. 21-31-------- | 1,911 | 12 | | 9.2 | 3.0 | 42 | | 42 | 9.0 | 58 | -- | .8 | | 155 | .21 | 800 | 36 | 1 | 72 | 3.0 | 272 | 6.2 |
| Sept. 1-4, 9-11-------- | 2,023 | 30 | | 13 | 4.4 | 41 | | 90 | 7.8 | 40 | -- | .5 | | a190 | .26 | 1,040 | 50 | 0 | 64 | 2.5 | 292 | 6.4 |
| Sept. 5-8-------- | 2,410 | 11 | | 11 | 4.3 | 60 | | 36 | 13 | 93 | -- | .5 | | 211 | .29 | 1,370 | 45 | 16 | 74 | 3.9 | 402 | 6.9 |
| Sept. 12-20-------- | 921 | 13 | | 7.8 | 3.4 | 24 | | 38 | 9.8 | 31 | -- | .8 | | 109 | .15 | 271 | 34 | 2 | 61 | 1.8 | 188 | 6.4 |
| Sept. 21-30-------- | 758 | 15 | | 9.0 | 3.7 | 28 | | 41 | 11 | 37 | -- | .8 | | 124 | .17 | 254 | 38 | 4 | 62 | 2.0 | 213 | 6.4 |
| Weighted average----- | 6,545 | 11 | | 9.0 | 3.3 | 25 | | 23 | 19 | 36 | -- | 1.3 | | 117 | 0.16 | 2,070 | 36 | 17 | 60 | 1.8 | 202 | -- |

a Residue on evaporation at 180°C.

## 325. NECHES RIVER NEAR ALTO, TEX.

LOCATION.--At gaging station at bridge on State Highway 21, 600 feet downstream from Bowles Creek, 7½ miles southwest of Alto, Cherokee County, and at mile 274.
DRAINAGE AREA.--1,943 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960.
Water temperatures: October 1959 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 198 ppm June 18; minimum, 90 ppm June 13-15, 26-28.
Hardness: Maximum, 54 ppm Apr. 1-10; minimum, 30 ppm June 13-15, 26-28.
Specific conductance: Maximum daily, 360 micromhos July 12; minimum daily, 117 micromhos June 27.
Water temperatures: Maximum, 87°F Aug. 5; minimum, 43°F Feb. 25-27, Mar. 5-6.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 27-31, Nov. 1-4, 6-7, 1959 | 487 | 24 | | 8.0 | 3.8 | 26 | | 20 | 21 | 38 | 0.1 | 1.0 | | 132 | 0.18 | 174 | 36 | 19 | 62 | 1.9 | 200 | 6.2 |
| Nov. 5, 8-20 | 626 | 20 | | 9.2 | 4.6 | 33 | | 25 | 21 | 50 | .1 | .8 | | a161 | .22 | 272 | 42 | 21 | 63 | 2.2 | 263 | 6.2 |
| Nov. 21-30 | 433 | 27 | | 10 | 5.1 | 34 | | 29 | 22 | 51 | .1 | .5 | | a166 | .23 | 194 | 46 | 22 | 61 | 2.2 | 275 | 6.5 |
| Dec. 1-15 | 508 | 25 | | 9.0 | 4.5 | 26 | | 28 | 21 | 36 | .1 | .8 | | 136 | .18 | 187 | 41 | 18 | 58 | 1.8 | 222 | 6.9 |
| Dec. 16-31 | 2,711 | 18 | | 7.0 | 3.8 | 20 | | 14 | 23 | 28 | .1 | .8 | | 108 | .15 | 791 | 33 | 22 | 56 | 1.5 | 177 | 6.6 |
| Jan. 1-10, 1960 | 2,941 | 18 | | 9.0 | 4.9 | 23 | | 16 | 28 | 35 | .1 | .4 | | 126 | .17 | 1,000 | 43 | 30 | 54 | 1.5 | 204 | 6.1 |
| Jan. 11-20 | 3,429 | 15 | | 9.0 | 4.7 | 20 | | 12 | 28 | 32 | .1 | .5 | | 115 | .16 | 1,060 | 42 | 32 | 51 | 1.3 | 194 | 5.8 |
| Jan. 21-31 | 3,728 | 14 | | 8.2 | 4.4 | 20 | | 14 | 27 | 30 | .1 | .5 | | 111 | .15 | 1,120 | 39 | 27 | 53 | 1.4 | 183 | 6.1 |
| Feb. 1-10 | 2,292 | 14 | | 10 | 4.7 | 23 | | 18 | 29 | 34 | .1 | .2 | | 124 | .17 | 767 | 44 | 30 | 53 | 1.5 | 215 | 6.7 |
| Feb. 11-23 | 1,940 | 13 | | 10 | 5.1 | 24 | | 18 | 33 | 34 | .1 | .2 | | 128 | .17 | 670 | 46 | 31 | 53 | 1.5 | 225 | 6.7 |
| Feb. 24-29 | 2,858 | 14 | | 9.0 | 4.0 | 20 | | 18 | 26 | 28 | .1 | .2 | | 110 | .15 | 849 | 39 | 24 | 52 | 1.4 | 186 | 6.7 |
| Mar. 1-10 | 3,665 | 12 | | 8.2 | 4.5 | 20 | | 12 | 27 | 30 | .2 | .8 | | 109 | .15 | 1,080 | 39 | 29 | 52 | 1.4 | 186 | 6.2 |
| Mar. 11-20 | 3,049 | 12 | | 9.0 | 4.9 | 20 | | 15 | 31 | 29 | .1 | .5 | | 114 | .16 | 938 | 43 | 30 | 51 | 1.3 | 198 | 6.2 |
| Mar. 21-31 | 1,660 | 13 | | 10 | 5.9 | 24 | | 20 | 33 | 36 | .1 | .5 | | a144 | .20 | 645 | 49 | 33 | 52 | 1.5 | 233 | 6.3 |
| Apr. 1-10 | 1,157 | 13 | | 11 | 6.4 | 24 | 2.8 | 28 | 31 | 38 | .2 | .8 | | 141 | .19 | 440 | 54 | 31 | 48 | 1.4 | 243 | 6.6 |
| Apr. 11-20 | 902 | 15 | | 11 | 6.2 | 24 | | 32 | 25 | 36 | .2 | .8 | | 134 | .18 | 326 | 53 | 27 | 49 | 1.4 | 232 | 6.8 |
| Apr. 21-29 | 704 | 17 | | 9.0 | 5.6 | 26 | | 36 | 22 | 34 | .3 | 1.0 | | 133 | .18 | 253 | 46 | 16 | 55 | 1.7 | 226 | 6.5 |
| Apr. 30, May 1 | 1,695 | -- | | -- | -- | 15 | | 18 | 18 | 21 | .2 | 1.5 | | -- | -- | -- | 33 | 18 | 49 | 1.1 | 148 | 6.5 |
| May 2-15 | 677 | 20 | | 10 | 4.9 | 28 | | 31 | 19 | 41 | .2 | 1.8 | | 140 | .19 | 256 | 45 | 20 | 57 | 1.8 | 231 | 6.7 |
| May 16-31 | 372 | 18 | | 9.5 | 5.0 | 27 | | 32 | 18 | 40 | .2 | 1.8 | | 136 | .18 | 137 | 44 | 18 | 57 | 1.8 | 226 | 6.8 |
| June 1-12 | 257 | 20 | | 10 | 4.3 | 25 | | 36 | 16 | 34 | .2 | 1.8 | | 129 | .18 | 89.5 | 43 | 13 | 56 | 1.7 | 207 | 6.5 |
| June 13-15, 26-28 | 817 | 16 | | 6.5 | 3.3 | 16 | | 19 | 15 | 22 | .6 | 1.8 | | 90 | .12 | 199 | 30 | 14 | 54 | 1.3 | 139 | 6.2 |
| June 16-17, 19-25, 29-30 | 425 | 20 | | 10 | 4.4 | 28 | | 30 | 18 | 42 | .2 | 1.5 | | 139 | .19 | 160 | 43 | 18 | 59 | 1.9 | 227 | 6.4 |
| June 18 | 374 | 17 | | -- | -- | 51 | | b33 | 17 | 81 | .2 | .2 | | 198 | .27 | 200 | 48 | 21 | 70 | 3.2 | 354 | 8.8 |
| July 1-10 | 553 | 20 | | 9.8 | 4.4 | 26 | | 26 | 20 | 39 | .2 | 1.2 | | 134 | .18 | 200 | 43 | 21 | 57 | 1.7 | 215 | 6.6 |
| July 11-20 | 225 | 22 | | 13 | 5.1 | 37 | | 35 | 21 | 57 | .2 | 1.8 | | 174 | .24 | 106 | 53 | 25 | 60 | 2.2 | 288 | 6.6 |
| July 21-31 | 405 | 19 | | 10 | 4.1 | 24 | | 26 | 22 | 35 | .2 | 1.2 | | 128 | .17 | 140 | 42 | 20 | 56 | 1.6 | 206 | 6.6 |
| Aug. 1-10 | 188 | 19 | | 11 | 4.7 | 29 | | 34 | 21 | 42 | .4 | 1.2 | | 145 | .20 | 73.6 | 47 | 19 | 58 | 1.8 | 245 | 6.6 |
| Aug. 11-20 | 145 | 19 | | 10 | 4.2 | 25 | | 34 | 15 | 37 | .3 | 1.2 | | 129 | .18 | 50.5 | 42 | 14 | 57 | 1.7 | 209 | 6.5 |
| Aug. 21-31 | 162 | 20 | | 10 | 4.4 | 28 | | 34 | 15 | 42 | .2 | 1.2 | | 138 | .19 | 60.4 | 43 | 15 | 59 | 1.9 | 231 | 6.6 |
| Sept. 1-10 | 193 | 17 | | 10 | 4.2 | 27 | | 32 | 22 | 36 | .1 | 1.5 | | a147 | .20 | 76.6 | 42 | 16 | 58 | 1.8 | 218 | 6.6 |
| Sept. 11-20 | 118 | 18 | | 10 | 4.4 | 25 | | 38 | 16 | 34 | .1 | 1.5 | | a140 | .19 | 44.6 | 43 | 12 | 56 | 1.7 | 208 | 6.7 |
| Sept. 21-30 | 174 | 15 | | 8.8 | 3.7 | 20 | | 36 | 11 | 28 | .1 | 1.2 | | 106 | .14 | 49.8 | 37 | 8 | 55 | 1.4 | 175 | 6.6 |
| Weighted average | c1,194 | 16 | | 9.0 | 4.7 | 23 | | 19 | 26 | 33 | 0.1 | 0.7 | | 122 | 0.17 | 393 | 42 | 26 | 54 | 1.5 | 204 | -- |

a Residue on evaporation at 180°C.
b Includes the equivalent of 11 parts per million of carbonate ($CO_3$).
c Represents 98 percent of flow for water year October 1959 to September 1960.

## 370. ANGELINA RIVER NEAR LUFKIN, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59, 200 feet upstream from Procella Creek, 1½ miles downstream from Bayou Loco, 1.5 miles upstream from Southern Pacific Railroad bridge, and 8 miles north of Lufkin, Angelina County.
DRAINAGE AREA.--1,604 square miles (revised).
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1960.
Water temperatures: October 1954 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 254 ppm Aug. 5-17; minimum, 56 ppm Feb. 22-29.
Hardness: Maximum, 56 ppm Aug. 5-17; minimum, 20 ppm Feb. 22-29.
Specific conductance: Maximum daily, 593 micromhos Aug. 10; minimum daily, 56 micromhos Feb. 26.
Water temperatures: Maximum, 86°F July 14; minimum, 38°F Jan. 20-22, Feb. 25.
EXTREMES, 1954-60.--Dissolved solids: Maximum, 412 ppm Nov. 4-18, 26-30, 1954; minimum, 36 ppm Oct. 16-18, 1957.
Hardness: Maximum, 76 ppm Nov. 4-18, 26-30, 1954; minimum, 11 ppm Oct. 16-18, 1957.
Specific conductance: Maximum daily, 895 micromhos Nov. 10, 1954; minimum daily, 38 micromhos Sept. 21, 1958.
Water temperatures: Maximum, 89°F July 9, 1957; minimum, 38°F on several days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-15, 1959 | 141 | 18 | | 6.5 | 3.4 | 18 | 3.1 | 38 | 12 | 21 | 0.1 | 0.8 | | 102 | 0.14 | 38.8 | 30 | 0 | 53 | 1.4 | 163 | 6.8 |
| Oct. 16-25 | 274 | 17 | | 7.2 | 3.8 | 29 | | 21 | 20 | 42 | -- | .2 | | 129 | .18 | 95.4 | 34 | 16 | 65 | 2.2 | 224 | 6.8 |
| Oct. 26-31 | 162 | 14 | | 10 | 5.4 | 61 | | 22 | 18 | 101 | -- | .0 | | 220 | .30 | 96.2 | 47 | 29 | 74 | 3.9 | 414 | 6.5 |
| Nov. 1-5 | 319 | 15 | | 8.8 | 5.1 | 37 | | 26 | 17 | 60 | -- | .8 | | 157 | .21 | 135 | 43 | 22 | 65 | 2.5 | 286 | 6.4 |
| Nov. 6-10 | 713 | 13 | | 5.0 | 4.0 | 21 | | 17 | 27 | 22 | -- | .8 | | 101 | .14 | 194 | 29 | 15 | 61 | 1.7 | 147 | 6.3 |
| Nov. 11-21 | 700 | 17 | | 7.5 | 3.0 | 33 | | 16 | 24 | 45 | -- | .5 | | 138 | .19 | 261 | 31 | 18 | 70 | 2.6 | 241 | 6.3 |
| Nov. 22-30 | 424 | 16 | | 8.2 | 3.5 | 38 | | 20 | 26 | 52 | -- | .5 | | a160 | .22 | 183 | 35 | 18 | 70 | 2.8 | 268 | 6.4 |
| Dec. 1-2, 6-12, 16, 31 | 593 | 19 | | 7.0 | 4.4 | 29 | | 25 | 23 | 38 | -- | .1 | | a138 | .19 | 221 | 36 | 15 | 64 | 2.1 | 212 | 6.9 |
| Dec. 3-5, 13-15 | 387 | 16 | | 9.5 | 5.5 | 52 | | 22 | 21 | 84 | -- | .2 | | a209 | .28 | 218 | 46 | 28 | 71 | 3.3 | 351 | 6.7 |
| Dec. 17-30 | 2,418 | 15 | | 6.0 | 3.2 | -- | | 16 | 18 | -- | -- | .5 | | -- | -- | -- | 28 | 15 | -- | -- | 128 | 6.5 |
| Jan. 1-10, 1960 | 2,087 | 15 | | 5.8 | 3.2 | 14 | | 16 | 20 | 17 | -- | .8 | | 102 | .11 | 473 | 28 | 14 | 53 | 1.2 | 130 | 6.2 |
| Jan. 11-17 | 2,193 | 15 | | 8.0 | 5.0 | 23 | | 16 | 30 | 32 | -- | .4 | | a133 | .18 | 788 | 40 | 27 | 55 | 1.6 | 201 | 6.3 |
| Jan. 18-23 | 2,535 | 14 | | 5.5 | 3.0 | 12 | | 18 | 16 | 14 | -- | .8 | | 74 | .10 | 506 | 26 | 11 | 50 | 1.0 | 114 | 6.4 |
| Jan. 24-31 | 2,745 | 15 | | 6.5 | 4.1 | 16 | | 18 | 21 | 22 | -- | .5 | | 94 | .13 | 697 | 33 | 18 | 51 | 1.2 | 153 | 6.5 |
| Feb. 1-10 | 1,741 | 17 | | 7.8 | 4.8 | 21 | | 18 | 28 | 29 | .1 | .2 | | 117 | .16 | 550 | 39 | 24 | 54 | 1.5 | 193 | 6.1 |
| Feb. 11-21 | 1,647 | 15 | | 7.8 | 5.0 | 22 | | 18 | 27 | 31 | .1 | .5 | | 117 | .16 | 520 | 40 | 25 | 54 | 1.5 | 200 | 6.3 |
| Feb. 22-29 | 2,698 | 13 | | 3.8 | 2.6 | 6.9 | 1.4 | 16 | 11 | 8.0 | .1 | 1.0 | | 56 | .08 | 408 | 20 | 7 | 41 | .7 | 85 | 5.9 |
| Mar. 1-8 | 3,708 | 13 | | 4.5 | 2.9 | 8.4 | 1.5 | 14 | 14 | 11 | .1 | 1.2 | | 64 | .09 | 641 | 23 | 12 | 42 | .8 | 99 | 6.1 |
| Mar. 9-15 | 4,377 | 14 | | 5.5 | 3.9 | 17 | | 13 | 22 | 23 | .1 | .5 | | 92 | .13 | 1,090 | 30 | 19 | 55 | 1.3 | 152 | 6.2 |
| Mar. 16-21 | 2,567 | 13 | | 5.2 | 3.2 | 11 | | 18 | 14 | 14 | .1 | 1.0 | | 70 | .10 | 485 | 26 | 11 | 48 | .9 | 114 | 6.3 |
| Mar. 22-31 | 1,437 | 12 | | 8.0 | 5.1 | 19 | | 20 | 27 | 26 | .1 | .5 | | 108 | .15 | 419 | 41 | 24 | 50 | 1.3 | 186 | 6.2 |
| Apr. 1-10 | 1,369 | 11 | | 8.5 | 6.5 | 21 | 1.8 | 28 | 30 | 28 | .1 | .5 | | a129 | .18 | 477 | 48 | 25 | 48 | 1.3 | 209 | 6.8 |
| Apr. 11-20 | 917 | 14 | | 10 | 6.8 | 25 | | 30 | 29 | 37 | .2 | .5 | | a150 | .20 | 371 | 53 | 28 | 51 | 1.5 | 238 | 6.8 |
| Apr. 21-30 | 593 | 15 | | 8.8 | 6.4 | 24 | | 34 | 25 | 33 | .1 | .5 | | a143 | .19 | 229 | 48 | 20 | 52 | 1.5 | 225 | 6.8 |
| May 1-3 | 1,333 | 14 | | 5.1 | 4.2 | 21 | | 22 | 19 | 26 | -- | .8 | | 101 | .14 | 364 | 30 | 12 | 60 | 1.7 | 160 | 6.6 |
| May 4-10 | 863 | 16 | | 9.0 | 5.4 | 19 | | 26 | 28 | 24 | -- | 1.0 | | 115 | .16 | 268 | 45 | 23 | 48 | 1.2 | 189 | 6.4 |
| May 11-18 | 297 | 17 | | 10 | 6.1 | 35 | | 30 | 24 | 54 | -- | .8 | | a174 | .24 | 140 | 50 | 25 | 60 | 2.2 | 280 | 6.7 |
| May 19-31 | 183 | 18 | | 8.0 | 4.8 | 20 | | 33 | 17 | 26 | -- | 1.2 | | 111 | .15 | 54.8 | 40 | 13 | 52 | 1.4 | 182 | 6.5 |
| June 1-14 | 150 | 20 | | 7.2 | 3.7 | 23 | | 40 | 15 | 24 | .2 | 1.0 | | 114 | .16 | 46.2 | 33 | 0 | 60 | 1.7 | 170 | 6.7 |
| June 15-18, 28-30 | 687 | 15 | | 5.2 | 3.0 | 15 | | 18 | 17 | 17 | .1 | 1.0 | | 82 | .11 | 152 | 25 | 11 | 56 | 1.3 | 130 | 6.3 |
| June 19-20 | 676 | 15 | | 10 | 6.3 | 52 | | 15 | 32 | 85 | .1 | .5 | | 208 | .28 | 380 | 52 | 40 | 69 | 3.1 | 375 | 6.7 |
| June 21-27 | 309 | 16 | | 8.2 | 4.6 | 25 | | 20 | 25 | 36 | .1 | 1.0 | | 126 | .17 | 105 | 39 | 23 | 58 | 1.7 | 213 | 6.3 |
| July 1-6 | 956 | 15 | | 8.8 | 4.9 | 31 | | 16 | 24 | 50 | -- | 1.0 | | 143 | .19 | 369 | 42 | 29 | 62 | 2.1 | 245 | 6.3 |
| July 7-13 | 241 | 18 | | 12 | 6.2 | 52 | | 23 | 23 | 88 | -- | 1.0 | | 211 | .29 | 137 | 55 | 37 | 67 | 3.0 | 377 | 6.3 |
| July 14-20 | 115 | 20 | | 9.0 | 4.6 | 26 | | 36 | 16 | 36 | -- | 1.8 | | 131 | .18 | 40.7 | 41 | 12 | 58 | 1.8 | 208 | 6.8 |
| July 21-26 | 402 | 16 | | 6.2 | 3.4 | 20 | | 22 | 16 | 26 | -- | 1.2 | | 100 | .14 | 109 | 29 | 11 | 59 | 1.6 | 155 | 6.4 |
| July 27-31 | 305 | 14 | | 11 | 5.5 | 61 | | 16 | 20 | 105 | -- | .5 | | 225 | .31 | 185 | 50 | 37 | 73 | 3.8 | 412 | 6.1 |

a Residue on evaporation at 180°C.

370. ANGELINA RIVER NEAR LUFKIN, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Aug. 1-4, 1960 | 168 | 20 | | 9.2 | 4.1 | 34 | | 28 | 16 | 52 | -- | 1.2 | | 150 | 0.20 | 68.0 | 40 | 17 | 65 | 2.3 | 247 | 6.9 |
| Aug. 5-17 | 66.2 | 17 | | 12 | 6.3 | 70 | | 29 | 18 | 117 | -- | .2 | | 254 | .35 | 45.4 | 56 | 32 | 73 | 4.1 | 456 | 6.5 |
| Aug. 18-29 | 192 | 16 | | 6.2 | 3.2 | 21 | | 30 | 14 | 24 | -- | 1.2 | | 101 | .14 | 52.4 | 29 | 4 | 61 | 1.7 | 154 | 6.4 |
| Aug. 30-31 | 247 | -- | | -- | -- | -- | | 14 | -- | 51 | -- | -- | | -- | -- | -- | 35 | 24 | -- | -- | 251 | 6.5 |
| Sept. 1-4 | 185 | 19 | | 8.8 | 5.5 | 50 | | 16 | 25 | 80 | -- | .8 | | 197 | .27 | 98.4 | 45 | 31 | 71 | 3.2 | 348 | 6.7 |
| Sept. 5-11 | 155 | 18 | | 6.5 | 3.8 | 24 | | 22 | 20 | 32 | -- | .8 | | 116 | .16 | 48.5 | 32 | 14 | 62 | 1.8 | 189 | 6.5 |
| Sept. 12-18 | 56.0 | 16 | | 11 | 6.2 | 62 | | 22 | 20 | 105 | -- | .5 | | 232 | .32 | 35.1 | 53 | 35 | 72 | 3.7 | 437 | 6.4 |
| Sept. 19-25, 29-30 | 141 | 15 | | 7.0 | 4.3 | 35 | | 30 | 14 | 51 | -- | .8 | | 142 | .19 | 54.1 | 35 | 11 | 69 | 2.6 | 255 | 6.3 |
| Sept. 26-28 | 113 | 18 | | 5.8 | 3.7 | 21 | | 32 | 13 | 24 | -- | .8 | | 102 | .14 | 31.1 | 30 | 3 | 60 | 1.7 | 169 | 7.0 |
| Weighted average | 984 | 15 | | 6.6 | 4.1 | 19 | | 19 | 21 | 26 | -- | 0.7 | | 103 | 0.14 | 274 | 33 | 18 | 55 | 1.4 | 166 | -- |

## 410. NECHES RIVER AT EVADALE, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 96, 200 feet upstream from Gulf, Colorado & Santa Fe Railway bridge at Evadale, Jasper County, 600 feet downstream from Mill Creek, 15 miles upstream from Village Creek and at mile 55.
DRAINAGE AREA.--7,923 square miles (revised).
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1960.
Water temperatures: October 1947 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 172 ppm Dec. 1-10, 11-20; minimum, 72 ppm Mar. 1-10.
Hardness: Maximum, 50 ppm Apr. 11-20, June 1-15; minimum, 26 ppm Mar. 1-10.
Specific conductance: Maximum daily, 357 micromhos Dec. 8; minimum daily, 112 micromhos Mar. 5.
Water temperatures: Maximum, 91°F July 29; minimum, 44°F Mar. 2-4, 6-8.
EXTREMES, 1947-60.--Dissolved solids: Maximum, 222 ppm Oct. 21-31, 1956; minimum, 35 ppm Sept. 21-22, 24, 1958.
Hardness: Maximum, 70 ppm Nov. 1-10, 1947; minimum, 14 ppm May 3-15, Oct. 27-31, 1957, Sept. 21-22, 24, 1958.
Specific conductance: Maximum daily, 422 micromhos Jan. 25, 1957; minimum daily, 44 micromhos Sept. 22, 1958.
Water temperatures: Minimum, 37°F Jan. 30-31, 1948, Jan. 31, 1949.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-10, 1959-------- | 274 | -- | | -- | -- | -- | | -- | -- | -- | -- | -- | | -- | -- | -- | -- | -- | -- | -- | 204 | -- |
| Oct. 11-20------------- | 510 | 22 | | 10 | 3.5 | 21 | | 40 | 12 | 28 | 0.1 | 0.8 | | 117 | 0.16 | 161 | 40 | 6 | 54 | 1.4 | 185 | 6.7 |
| Oct. 21-31------------- | 1,191 | 18 | | 9.8 | 3.4 | 29 | | 42 | 14 | 37 | .2 | .8 | | 133 | .18 | 428 | 38 | 4 | 62 | 2.0 | 225 | 6.7 |
| Nov. 1-10-------------- | 1,704 | 17 | | 8.0 | 2.8 | 28 | | 38 | 17 | 30 | .2 | 1.2 | | 123 | .17 | 566 | 32 | 0 | 66 | 2.2 | 210 | 6.5 |
| Nov. 11-20------------- | 3,435 | 17 | | 7.8 | 2.5 | 26 | | 30 | 18 | 29 | .1 | 1.2 | | 117 | .16 | 1,090 | 30 | 6 | 65 | 2.1 | 199 | 6.4 |
| Nov. 21-30------------- | 2,569 | 16 | | 7.5 | 2.7 | 25 | | 24 | 19 | 30 | .1 | 1.2 | | 114 | .16 | 791 | 30 | 10 | 65 | 2.0 | 194 | 6.4 |
| Dec. 1-10-------------- | 1,870 | 39 | | 12 | 4.1 | 32 | | 42 | 23 | 40 | .1 | 1.2 | | 172 | .23 | 868 | 47 | 12 | 60 | 2.0 | 267 | 6.9 |
| Dec. 11-20------------- | 3,540 | 47 | | 11 | 4.0 | 30 | | 40 | 21 | 38 | .1 | 1.2 | | 172 | .23 | 1,640 | 44 | 11 | 60 | 2.0 | 241 | 7.0 |
| Dec. 21-31------------- | 11,430 | 53 | | 10 | 2.8 | 20 | | 40 | 18 | 19 | .1 | 1.0 | | 144 | .20 | 4,440 | 36 | 4 | 54 | 1.4 | 173 | 6.9 |
| Jan. 1-10, 1960-------- | 10,680 | 11 | | 8.2 | 2.8 | 18 | | 13 | 23 | 26 | .1 | .5 | | 96 | .13 | 2,770 | 32 | 22 | 56 | 1.4 | 165 | 6.4 |
| Jan. 11-20------------- | 11,230 | 13 | | 8.0 | 2.8 | 18 | | 12 | 24 | 24 | .1 | .5 | | 96 | .13 | 2,910 | 32 | 22 | 55 | 1.4 | 158 | 6.3 |
| Jan. 21-31------------- | 9,302 | 11 | | 9.0 | 3.3 | 20 | | 14 | 28 | 28 | .1 | .2 | | 107 | .15 | 2,690 | 36 | 24 | 55 | 1.4 | 182 | 6.4 |
| Feb. 1-10-------------- | 10,840 | 13 | | 8.2 | 3.6 | 21 | | 13 | 27 | 30 | .1 | .2 | | 109 | .15 | 3,190 | 36 | 25 | 56 | 1.5 | 184 | 6.3 |
| Feb. 11-20------------- | 8,882 | 13 | | 8.5 | 3.3 | 23 | | 15 | 27 | 30 | .1 | .2 | | 112 | .15 | 2,690 | 34 | 22 | 59 | 1.7 | 181 | 6.4 |
| Feb. 21-29------------- | 13,640 | 12 | | 7.5 | 2.9 | 18 | | 14 | 23 | 24 | .1 | .2 | | 93 | .13 | 3,500 | 30 | 19 | 56 | 1.4 | 164 | 6.2 |
| Mar. 1-10-------------- | 18,060 | 9.6 | | 6.2 | 2.5 | 12 | | 10 | 20 | 16 | .1 | .8 | | 72 | .10 | 3,510 | 26 | 18 | 50 | 1.0 | 124 | 6.1 |
| Mar. 11-20------------- | 13,070 | 11 | | 8.0 | 3.5 | 20 | | 12 | 26 | 28 | .1 | .5 | | 103 | .14 | 3,630 | 34 | 24 | 55 | 1.5 | 172 | 6.1 |
| Mar. 21-31------------- | 10,760 | 11 | | 9.0 | 3.9 | 23 | | 15 | 29 | 32 | .1 | .2 | | 115 | .16 | 3,340 | 38 | 26 | 56 | 1.6 | 198 | 6.1 |
| Apr. 1-10-------------- | 4,856 | 14 | | 10 | 5.0 | 24 | 2.4 | 22 | 32 | 36 | .2 | .2 | | a146 | .20 | 1,910 | 46 | 28 | 52 | 1.5 | 221 | 6.9 |
| Apr. 11-20------------- | 3,593 | 12 | | 11 | 5.3 | 27 | | 26 | 33 | 36 | .2 | .2 | | a148 | .20 | 1,440 | 50 | 28 | 54 | 1.7 | 226 | 7.0 |
| Apr. 21-30------------- | 2,683 | 12 | | 11 | 5.2 | 29 | | 30 | 30 | 39 | .2 | .2 | | a154 | .21 | 1,120 | 49 | 24 | 56 | 1.8 | 235 | 6.7 |
| May 1-10--------------- | 5,553 | 13 | | 10 | 5.2 | 26 | | 28 | 27 | 35 | .2 | 1.2 | | 132 | .18 | 1,980 | 46 | 24 | 54 | 1.7 | 221 | 6.5 |
| May 11-20-------------- | 3,176 | 13 | | 9.5 | 4.1 | 22 | | 26 | 25 | 28 | .2 | 1.2 | | 116 | .16 | 995 | 40 | 19 | 54 | 1.5 | 190 | 6.4 |
| May 21-31-------------- | 2,286 | 13 | | 9.5 | 4.1 | 23 | | 28 | 24 | 29 | .2 | .8 | | 118 | .16 | 728 | 40 | 18 | 55 | 1.6 | 198 | 6.7 |
| June 1-15-------------- | 1,445 | 13 | | 12 | 4.8 | 27 | | 40 | 22 | 36 | .2 | 1.0 | | 136 | .18 | 531 | 50 | 16 | 54 | 1.7 | 232 | 6.5 |
| June 16-30------------- | 1,852 | 13 | | 10 | 4.2 | 31 | | 40 | 20 | 38 | .3 | 1.0 | | 138 | .19 | 690 | 42 | 10 | 61 | 2.1 | 230 | 6.4 |
| July 1-15-------------- | 2,662 | 13 | | 8.0 | 2.9 | 18 | | 27 | 15 | 23 | .2 | 1.2 | | 94 | .13 | 676 | 32 | 10 | 55 | 1.4 | 154 | 6.7 |
| July 16-31------------- | 1,662 | 14 | | 9.0 | 3.2 | 20 | | 29 | 16 | 26 | .2 | 1.2 | | 104 | .14 | 467 | 36 | 12 | 55 | 1.4 | 163 | 6.6 |
| Aug. 1-10-------------- | 1,704 | 16 | | 9.0 | 3.1 | 23 | | 28 | 16 | 32 | .2 | .8 | | 114 | .16 | 524 | 35 | 12 | 59 | 1.7 | 181 | 6.7 |
| Aug. 11-20------------- | 730 | 18 | | 11 | 3.7 | 26 | | 36 | 16 | 36 | .1 | 1.0 | | 130 | .18 | 256 | 42 | 13 | 57 | 1.7 | 202 | 6.6 |
| Aug. 21-31------------- | 319 | 16 | | 10 | 3.8 | 21 | | 36 | 12 | 30 | .1 | 1.0 | | 112 | .15 | 96.5 | 40 | 11 | 53 | 1.4 | 175 | 6.2 |
| Sept. 1-10------------- | 254 | 19 | | 10 | 3.8 | 24 | | 41 | 12 | 32 | .2 | 1.0 | | 122 | .17 | 83.7 | 41 | 7 | 56 | 1.6 | 191 | 6.6 |
| Sept. 11-20------------ | 610 | 16 | | 10 | 4.0 | 29 | | 37 | 16 | 40 | .2 | .8 | | 134 | .18 | 221 | 41 | 11 | 60 | 2.0 | 223 | 6.4 |
| Sept. 21-30------------ | 532 | 15 | | 9.5 | 3.8 | 29 | | 38 | 15 | 38 | .2 | 1.0 | | a142 | .19 | 204 | 39 | 8 | 61 | 2.0 | 217 | 6.4 |
| Weighted average----- | 4,728 | 16 | | 8.6 | 3.4 | 21 | | 20 | 24 | 27 | 0.1 | 0.6 | | 112 | 0.15 | 1,430 | 36 | 19 | 56 | 1.5 | 180 | -- |

a Residue on evaporation at 180°C.

## 625. TRINITY RIVER NEAR ROSSER, TEX.

LOCATION.--At gaging station at bridge on State Highway 34, 2.5 miles south of Rosser, Kaufman County, and 8.5 miles downstream from East Fork Trinity River.
DRAINAGE AREA.--8,162 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1960.
Water temperatures: October 1954 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 653 ppm Aug. 16-20; minimum, 133 ppm Oct. 5.
Hardness: Maximum, 210 ppm Mar. 11-20; minimum, 86 ppm Oct. 5.
Specific conductance: Maximum daily, 1,160 micromhos July 13; minimum daily, 220 micromhos Oct. 5.
Water temperatures: Maximum, 91°F July 27-28; minimum, 37°F Feb. 25.
EXTREMES, 1954-60.--Dissolved solids: Maximum, 1,800 ppm Aug. 21-31, 1956; minimum, 133 ppm Oct. 5, 1959.
Hardness: Maximum, 310 ppm Oct. 11-20, 1956; minimum, 86 ppm Oct. 5, 1959.
Specific conductance: Maximum daily, 2,990 micromhos Oct. 13, 1956; minimum daily, 220 micromhos Oct. 5, 1959.
Water temperatures: Maximum, 97°F July 1, 1955; minimum, 34°F Jan. 20, 1956, Dec. 23, 1958, Jan. 3, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1, 1959---------- | 2,020 | -- | | -- | -- | -- | -- | 131 | -- | 62 | -- | -- | | -- | -- | -- | 116 | 8 | -- | -- | 600 | 7.7 |
| Oct. 2-4, 6-10--------- | 11,720 | 11 | | 45 | 3.4 | 21 | 5.1 | 128 | 42 | 18 | -- | 4.5 | | 216 | 0.29 | 6,840 | 126 | 21 | 26 | 0.8 | 360 | 7.1 |
| Oct. 5---------- | 14,900 | -- | | -- | -- | -- | -- | 78 | -- | 11 | -- | -- | | 133 | .18 | 5,350 | 86 | 22 | -- | -- | 220 | 7.6 |
| Oct. 11-20---------- | 5,747 | 10 | | 46 | 4.9 | 26 | | 154 | 28 | 23 | -- | 4.0 | | 222 | .30 | 3,440 | 135 | 9 | 29 | 1.0 | 381 | 7.4 |
| Oct. 21-31---------- | 2,178 | 9.0 | | 46 | 5.4 | 32 | | 151 | 35 | 30 | -- | 6.0 | | 245 | .33 | 1,440 | 137 | 13 | 34 | 1.2 | 422 | 7.0 |
| Nov. 1-9---------- | 1,582 | 11 | | 52 | 4.7 | 45 | | 160 | 60 | 33 | -- | 8.8 | | 308 | .42 | 1,320 | 149 | 18 | 40 | 1.6 | 496 | 7.3 |
| Nov. 10-20---------- | 757 | 14 | | 65 | 5.2 | 60 | | 186 | 81 | 46 | -- | 15 | | 386 | .52 | 789 | 184 | 31 | 42 | 1.9 | 635 | 6.9 |
| Nov. 21-30---------- | 514 | 12 | | 65 | 5.6 | 87 | | 217 | 96 | 57 | -- | 20 | | 451 | .61 | 626 | 185 | 7 | 51 | 2.8 | 750 | 6.8 |
| Dec. 1-12---------- | 420 | 14 | | 65 | 5.6 | 104 | | 201 | 117 | 72 | -- | 27 | | 522 | .71 | 592 | 185 | 20 | 55 | 3.3 | 822 | 7.8 |
| Dec. 13-20---------- | 6,173 | 12 | | 50 | 2.6 | 24 | | 138 | 45 | 16 | -- | 7.5 | | 234 | .32 | 3,900 | 135 | 22 | 28 | .9 | 373 | 7.6 |
| Dec. 21-31---------- | 3,768 | 11 | | 58 | 4.4 | 34 | | 160 | 50 | 35 | -- | 5.3 | | 288 | .39 | 2,930 | 163 | 32 | 31 | 1.2 | 467 | 7.9 |
| Jan. 1-10, 1960--------- | 8,238 | 9.4 | | 52 | 3.7 | 24 | | 142 | 48 | 18 | -- | 6.4 | | 239 | .33 | 5,320 | 145 | 29 | 26 | .9 | 394 | 7.5 |
| Jan. 11-20---------- | 7,845 | 9.0 | | 56 | 4.2 | 29 | | 161 | 43 | 29 | -- | 4.2 | | 260 | .35 | 5,510 | 157 | 25 | 29 | 1.0 | 436 | 7.4 |
| Jan. 21-31---------- | 5,152 | 7.0 | | 57 | 4.9 | 29 | | 166 | 44 | 29 | -- | 4.5 | | 263 | .36 | 3,660 | 162 | 26 | 28 | 1.0 | 444 | 7.3 |
| Feb. 1-15---------- | 4,033 | 7.4 | | 60 | 4.7 | 32 | | 168 | 52 | 29 | 0.4 | 5.3 | | 276 | .38 | 3,010 | 169 | 31 | 29 | 1.1 | 464 | 7.3 |
| Feb. 16-29---------- | 2,304 | 5.6 | | 62 | 4.6 | 35 | | 171 | 61 | 28 | .4 | 7.3 | | 302 | .41 | 1,880 | 174 | 33 | 31 | 1.2 | 500 | 7.1 |
| Mar. 1-10---------- | 2,048 | 6.4 | | 67 | 5.4 | 41 | | 184 | 66 | 34 | .6 | 11 | | 334 | .45 | 1,850 | 189 | 38 | 32 | 1.3 | 530 | 7.5 |
| Mar. 11-20---------- | 1,118 | 7.0 | | 74 | 6.2 | 64 | | 199 | 96 | 49 | .8 | 18 | | 432 | .59 | 1,300 | 210 | 47 | 40 | 1.9 | 672 | 7.7 |
| Mar. 21-31---------- | 1,048 | 6.2 | | 69 | 6.1 | 69 | | 196 | 91 | 53 | .8 | 18 | | 423 | .58 | 1,200 | 197 | 36 | 43 | 2.1 | 669 | 7.7 |
| Apr. 1-10---------- | 750 | 9.2 | | 68 | 6.3 | 75 | 8.2 | 199 | 97 | 65 | .6 | 16 | | 462 | .63 | 936 | 196 | 32 | 44 | 2.3 | 734 | 7.5 |
| Apr. 11-25---------- | 425 | 12 | | 70 | 6.7 | 109 | | 212 | 126 | 80 | .7 | 23 | | 557 | .76 | 639 | 202 | 28 | 54 | 3.3 | 875 | 7.0 |
| Apr. 26-30---------- | 1,389 | 8.4 | | 56 | 4.9 | 58 | | 160 | 80 | 43 | .5 | 11 | | 358 | .49 | 1,340 | 160 | 28 | 44 | 2.0 | 572 | 7.0 |
| May 1-10---------- | 2,314 | 10 | | 58 | 5.0 | 50 | | 162 | 70 | 42 | -- | 10 | | 341 | .46 | 2,130 | 165 | 32 | 40 | 1.7 | 553 | 7.4 |
| May 11-20---------- | 1,158 | 8.2 | | 58 | 4.7 | 49 | | 179 | 61 | 38 | -- | 9.5 | | 336 | .46 | 1,050 | 164 | 18 | 39 | 1.7 | 546 | 7.3 |
| May 21-31---------- | 550 | 11 | | 58 | 5.2 | 95 | | 188 | 107 | 66 | -- | 17 | | 474 | .64 | 704 | 166 | 12 | 55 | 3.2 | 767 | 6.9 |
| June 1-14---------- | 346 | 15 | | 57 | 5.8 | 127 | | 200 | 111 | 101 | -- | 24 | | 563 | .77 | 526 | 166 | 2 | 62 | 4.3 | 916 | 7.3 |
| June 15-25---------- | 274 | 11 | | 54 | 5.9 | 135 | | 200 | 127 | 100 | -- | 18 | | 574 | .78 | 425 | 159 | 0 | 65 | 4.7 | 934 | 7.1 |
| June 26-30---------- | 873 | 13 | | 48 | 4.0 | 68 | | 150 | 75 | 50 | -- | 16 | | 373 | .51 | 879 | 136 | 14 | 52 | 2.5 | 593 | 7.3 |
| July 1-7, 10-13-------- | 304 | 18 | | 51 | 5.6 | 142 | | 194 | 130 | 104 | -- | 21 | | 619 | .84 | 508 | 150 | 0 | 67 | 5.0 | 939 | 7.6 |
| July 8-9, 14-18-------- | 1,019 | 13 | | 43 | 3.7 | 47 | | 136 | 39 | 46 | -- | 11 | | a270 | .37 | 743 | 122 | 11 | 46 | 1.9 | 494 | 7.4 |
| July 19-31---------- | 436 | 17 | | 49 | 4.6 | 86 | | 163 | 76 | 72 | -- | 19 | | a404 | .55 | 476 | 142 | 8 | 57 | 3.1 | 723 | 7.0 |
| Aug. 1-10---------- | 270 | 17 | | 50 | 5.3 | 128 | | 187 | 111 | 98 | -- | 23 | | 556 | .76 | 405 | 147 | 0 | 65 | 4.6 | 869 | 7.6 |
| Aug. 11-15---------- | 467 | 14 | | 45 | 4.8 | 101 | | 159 | 86 | 83 | -- | 18 | | 444 | .60 | 560 | 132 | 2 | 62 | 3.8 | 709 | 7.5 |
| Aug. 16-20---------- | 370 | 18 | | 51 | 6.0 | 162 | | 192 | 156 | 114 | -- | 29 | | 653 | .89 | 652 | 152 | 0 | 70 | 5.7 | 1,020 | 7.2 |
| Aug. 21-31---------- | 1,079 | 13 | | 46 | 3.9 | 76 | | 148 | 82 | 54 | -- | 16 | | 378 | .51 | 1,100 | 131 | 10 | 56 | 2.9 | 602 | 6.9 |
| Sept. 1-10---------- | 287 | 16 | | 50 | 5.5 | 122 | | 169 | 117 | 94 | -- | 25 | | 541 | .74 | 419 | 148 | 9 | 64 | 4.4 | 854 | 7.6 |
| Sept. 11-20---------- | 276 | 16 | | 44 | 5.9 | 138 | | 183 | 108 | 107 | -- | 26 | | 565 | .77 | 421 | 134 | 0 | 69 | 5.2 | 911 | 7.0 |
| Sept. 21-30---------- | 347 | 13 | | 43 | 5.8 | 141 | | 172 | 135 | 97 | -- | 25 | | 566 | .77 | 530 | 132 | 0 | 70 | 5.3 | 921 | 6.8 |
| Weighted average----- | 2,150 | 9.7 | | 54 | 4.4 | 39 | | 157 | 54 | 32 | -- | 7.8 | | 286 | 0.39 | 1,660 | 153 | 24 | 36 | 1.4 | 472 | -- |

a Calculated from determined constituents.

## 646. RICHLAND CREEK NEAR FAIRFIELD, TEX.

LOCATION.--At bridge on State Farm Highway 488, 4 miles upstream from mouth, 4 miles downstream from Chambers Creek and 16 miles north of Fairfield, Freestone County.
RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1960.
Water temperatures: April 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 6,500 ppm Aug. 22; minimum, 178 ppm Jan. 10, 14-17.
Hardness: Maximum, 325 ppm Sept. 18-24, 26-28, 30; minimum, 90 ppm Oct. 2.
Specific conductance: Maximum daily, 12,700 micromhos Sept. 30; minimum daily, 244 micromhos Oct. 5.
Water temperatures: Maximum, 92°F July 27; minimum, 35°F Jan. 20.
EXTREMES, 1956-60.--Dissolved solids: Maximum, 13,500 ppm Aug. 11-31, 1956; minimum, 131 ppm Apr. 21-30, 1957.
Hardness: Maximum, 460 ppm Oct. 18, 1956; minimum, 79 ppm Nov. 5-8, 1956.
Specific conductance: Maximum daily, 22,000 micromhos Aug. 22, 1956; minimum daily, 157 micromhos Apr. 25, 1957.
Water temperatures: Maximum, 98°F Aug. 3, 1957; minimum, freezing point Jan. 3-4, 1959.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 2, 1959 | | -- | | -- | -- | -- | | 133 | -- | 265 | -- | -- | | -- | -- | | 90 | 0 | -- | -- | 1,130 | 7.8 |
| Oct. 3-6, 9-11 | | 14 | | 46 | 2.7 | 38 | | 125 | 49 | 37 | 0.4 | 2.2 | | 259 | 0.35 | | 126 | 23 | 40 | 1.5 | 420 | 7.6 |
| Oct. 12-20 | | 13 | | 56 | 3.6 | 44 | | 153 | 45 | 53 | .4 | 2.8 | | 299 | .41 | | 154 | 29 | 38 | 1.5 | 505 | 7.5 |
| Oct. 21-31 | | 12 | | 84 | 5.3 | 151 | | 234 | 62 | 212 | .4 | 4.5 | | a646 | .88 | | 232 | 40 | 59 | 4.3 | 1,150 | 7.8 |
| Nov. 1, 3, 5-10 | | 13 | | 64 | 4.9 | 84 | | 171 | 72 | 103 | .4 | 2.2 | | 438 | .60 | | 180 | 40 | 51 | 2.7 | 745 | 7.5 |
| Nov. 11-15 | | 14 | | 82 | 7.0 | 185 | | 223 | 86 | 255 | .5 | 4.2 | | 745 | 1.01 | | 234 | 51 | 63 | 5.3 | 1,290 | 8.1 |
| Nov. 16-21 | | 15 | | 100 | 8.3 | 250 | | 278 | 86 | 358 | .5 | 4.5 | | 968 | 1.32 | | 284 | 56 | 66 | 6.4 | 1,700 | 8.2 |
| Nov. 22-30 | | 16 | | 98 | 9.6 | 309 | | 279 | 97 | 440 | .6 | 4.5 | | 1,110 | 1.51 | | 284 | 56 | 70 | 8.0 | 2,050 | 8.1 |
| Dec. 1-12 | | 13 | | 106 | 10 | 452 | | 305 | 98 | 660 | .6 | 4.5 | | 1,490 | 2.03 | | 306 | 56 | 76 | 11 | 2,720 | 8.1 |
| Dec. 13, 24 | | 22 | | 77 | 5.7 | 60 | | 213 | 63 | 71 | .6 | 4.5 | | a409 | .56 | | 216 | 41 | 38 | 1.8 | 692 | 8.1 |
| Dec. 14-22 | | 22 | | 52 | 4.2 | 11 | | 132 | 34 | 15 | .6 | 4.5 | | a208 | .28 | | 147 | 39 | 14 | .4 | 379 | 7.9 |
| Dec. 23-27 | | 19 | | 82 | 5.2 | 62 | | 214 | 70 | 76 | .3 | 6.4 | | 440 | .60 | | 226 | 50 | 37 | 1.8 | 735 | 8.0 |
| Jan. 10, 14-17, 1960 | | 14 | | 38 | 2.8 | 20 | | 123 | 24 | 16 | .3 | 2.0 | | 178 | .24 | | 106 | 6 | 29 | .8 | 297 | 7.8 |
| Jan. 11-13, 18-21 | | 12 | | 66 | 4.4 | 38 | | 184 | 55 | 37 | .3 | 4.6 | | a307 | .42 | | 182 | 32 | 31 | 1.2 | 517 | 7.9 |
| Jan. 22-27, Feb. 3 | | 11 | | 99 | 7.1 | 72 | | 251 | 81 | 89 | .5 | 18 | | 518 | .70 | | 276 | 70 | 36 | 1.9 | 849 | 7.8 |
| Feb. 4-6 | | 8.6 | | 59 | 5.0 | 36 | | 140 | 79 | 32 | .5 | 3.8 | | 307 | .42 | | 168 | 53 | 32 | 1.2 | 486 | 7.5 |
| Feb. 8-12 | | 10 | | 95 | 6.5 | 66 | | 247 | 87 | 76 | .5 | 6.6 | | 479 | .65 | | 264 | 61 | 35 | 1.8 | 787 | 7.8 |
| Feb. 14-16, 18-22 | | 11 | | 112 | 8.2 | 125 | | 283 | 106 | 167 | .4 | 7.1 | | 684 | .93 | | 313 | 81 | 46 | 3.1 | 1,150 | 7.8 |
| Feb. 29, Mar. 1-9 | | 9.6 | | 86 | 7.7 | 79 | | 193 | 115 | 96 | .6 | 4.8 | | 512 | .70 | | 246 | 88 | 41 | 2.2 | 827 | 8.0 |
| Mar. 10, 12, 14-19 | | 7.0 | | 94 | 9.0 | 140 | | 205 | 134 | 186 | .5 | 6.5 | | 713 | .97 | | 272 | 104 | 53 | 3.7 | 1,170 | 7.8 |
| Mar. 22-26, 28-31 | | 6.0 | | 104 | 11 | 193 | | 238 | 146 | 262 | .6 | 6.1 | | 881 | 1.20 | | 304 | 110 | 58 | 4.8 | 1,460 | 7.9 |
| Mar. 27 | | -- | | -- | -- | -- | | 224 | -- | 143 | -- | -- | | -- | -- | | 262 | 78 | -- | -- | 997 | 8.2 |
| Apr. 1-3, 29 | | 6.4 | | 98 | 10 | 197 | 3.9 | 195 | 170 | 270 | .4 | 6.0 | | 875 | 1.19 | | 286 | 126 | 60 | 5.1 | 1,490 | 7.5 |
| Apr. 5-6, 8, 10-11, 14-16, 19-21, 26 | | 8.0 | | 102 | 11 | 307 | | 245 | 147 | 430 | .5 | 5.7 | | 1,130 | 1.54 | | 300 | 98 | 69 | 7.7 | 1,990 | 7.8 |
| Apr. 7, 18, 22, 24-25, 27 | | 8.0 | | 106 | 12 | 444 | | 260 | 137 | 650 | .6 | 7.6 | | 1,490 | 2.03 | | 314 | 101 | 75 | 11 | 2,600 | 7.6 |
| Apr. 28 | | -- | | -- | -- | -- | | 232 | -- | 140 | -- | -- | | -- | -- | | 292 | 102 | -- | -- | 1,060 | 8.0 |
| May 1-3, 7-9 | | 15 | | 56 | 4.4 | 60 | | 130 | 84 | 64 | .6 | 4.5 | | 352 | .48 | | 158 | 51 | 46 | 2.1 | 591 | 7.6 |
| May 4-6 | | 14 | | 70 | 6.7 | 167 | | 184 | 97 | 218 | .6 | 4.0 | | a667 | .91 | | 202 | 51 | 64 | 5.1 | 1,170 | 7.8 |
| May 10-16 | | 15 | | 69 | 6.2 | 199 | | 182 | 99 | 265 | .6 | 3.0 | | a746 | 1.01 | | 198 | 48 | 69 | 6.1 | 1,310 | 7.8 |
| May 17-21, 24-26, 28 | | 13 | | 84 | 9.4 | 379 | | 240 | 96 | 545 | .5 | 5.3 | | 1,250 | 1.70 | | 248 | 52 | 77 | 10 | 2,280 | 7.8 |
| May 29 | | -- | | -- | -- | -- | | 233 | -- | 205 | -- | -- | | -- | -- | | 256 | 65 | -- | -- | 1,220 | 7.9 |
| May 30, June 1-2 | | 11 | | 72 | 8.4 | 287 | | 195 | 108 | 398 | .6 | 4.0 | | a985 | 1.34 | | 214 | 54 | 74 | 8.5 | 1,740 | 7.5 |

a Calculated from determined constituents.

646. RICHLAND CREEK NEAR FAIRFIELD, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| June 10, 12-13, 1960--- | | 11 | | 83 | 9.8 | 561 | | 198 | 113 | 840 | 0.7 | 2.0 | | 1,720 | 2.34 | | 248 | 85 | 83 | 15 | 3,070 | 7.7 |
| June 14-15---------- | | 13 | | 36 | 3.3 | 54 | | 110 | 38 | 62 | .4 | 4.0 | | a265 | .36 | | 103 | 13 | 53 | 2.3 | 453 | 7.2 |
| June 16-19, 21-22, 24-- | | 12 | | 55 | 5.2 | 123 | | 162 | 70 | 154 | .6 | 1.0 | | a501 | .68 | | 158 | 26 | 63 | 4.3 | 878 | 7.4 |
| June 25---------- | | -- | | -- | -- | -- | | 230 | -- | 372 | -- | -- | | -- | -- | | 230 | 64 | -- | -- | 1,610 | 7.9 |
| June 26---------- | | -- | | -- | -- | -- | | 199 | -- | 615 | -- | -- | | -- | -- | | 240 | 77 | -- | -- | 2,310 | 7.9 |
| June 27---------- | | -- | | -- | -- | -- | | 232 | -- | 1,420 | -- | -- | | -- | -- | | 184 | 0 | -- | -- | 4,580 | 7.7 |
| June 28---------- | | 14 | | 41 | 3.8 | 63 | | 124 | 46 | 70 | .6 | 6.7 | | a306 | .42 | | 118 | 16 | 54 | 2.5 | 530 | 7.4 |
| June 29-30, July 1-2--- | | 20 | | 50 | 3.9 | 54 | | 145 | 53 | 54 | .7 | 7.4 | | 326 | .44 | | 141 | 22 | 45 | 2.0 | 507 | 7.8 |
| July 4-7---------- | | 16 | | 69 | 6.4 | 244 | | 197 | 65 | 350 | .6 | 4.8 | | 868 | 1.18 | | 198 | 37 | 73 | 7.5 | 1,500 | 7.7 |
| July 8-11, 13-15, 17-19, 21-24, 26-27--------- | | 7.6 | | 82 | 9.5 | 731 | | 233 | 82 | 1,100 | .7 | 3.5 | | 2,130 | 2.90 | | 244 | 52 | 87 | 20 | 3,830 | 7.7 |
| Aug. 8-11---------- | | -- | | -- | -- | -- | | 290 | -- | 2,580 | -- | -- | | -- | -- | | 270 | 32 | -- | -- | 8,010 | 7.6 |
| Aug. 12---------- | | 13 | | 48 | 4.3 | 104 | | 129 | 132 | 84 | .8 | .0 | | a449 | .61 | | 138 | 32 | 62 | 3.8 | 740 | 7.9 |
| Aug. 14-18---------- | | 12 | | 43 | 4.3 | 263 | | 150 | 32 | 380 | .6 | 3.0 | | a812 | 1.10 | | 125 | 2 | 82 | 10 | 1,490 | 7.8 |
| Aug. 20-21---------- | | 12 | | 54 | 7.7 | 711 | | 228 | 39 | 1,050 | .6 | 3.0 | | 1,990 | 2.71 | | 166 | 0 | 90 | 24 | 3,340 | 7.9 |
| Aug. 22---------- | | -- | | -- | -- | -- | | 438 | -- | 3,760 | -- | -- | | b 6,500 | 8.87 | | 284 | 0 | -- | -- | 11,200 | 8.0 |
| Aug. 24-25---------- | | 13 | | 43 | 3.2 | 47 | | 115 | 49 | 51 | .5 | 4.5 | | a268 | .36 | | 120 | 26 | 46 | 1.9 | 439 | 7.8 |
| Aug. 27-28---------- | | 13 | | 44 | 3.7 | 115 | | 132 | 47 | 152 | .6 | 1.2 | | a442 | .60 | | 125 | 17 | 67 | 4.5 | 770 | 8.1 |
| Aug. 29-30---------- | | 12 | | 50 | 4.9 | 255 | | 166 | 47 | 362 | .6 | 3.5 | | a817 | 1.11 | | 145 | 9 | 79 | 9.2 | 1,460 | 7.9 |
| Sept. 1-2---------- | | 14 | | 53 | 5.8 | 311 | | 183 | 51 | 445 | -- | 1.5 | | 982 | 1.34 | | 156 | 6 | 81 | 11 | 1,790 | 8.1 |
| Sept. 7-16---------- | | 6.0 | | 92 | 13 | 979 | | 266 | 75 | 1,500 | -- | 1.5 | | 2,800 | 3.81 | | 283 | 65 | 88 | 25 | 5,050 | 7.6 |
| Sept. 18-24, 26-28, 30- | | 6.4 | | 94 | 22 | 2,110 | | 404 | 64 | 3,200 | -- | -- | | 5,700 | 7.75 | | 325 | 0 | 93 | 51 | 9,940 | 7.7 |

a Calculated from determined constituents.
b Residue on evaporation at 180°C.

## 665. TRINITY RIVER AT ROMAYOR, TEX.

LOCATION.--At gaging station at bridge on State Highway 105, 1.9 miles south of Romayor, Liberty County, 2.0 miles downstream from Gulf, Colorado & Santa Fe Railway bridge and at mile 94.
DRAINAGE AREA.--17,192 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to November 1949, February 1950 to September 1951, April 1953 to September 1960.
Water temperatures: February 1950 to September 1951, April 1953 to January 1959.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 719 ppm Oct. 1-7; minimum, 94 ppm June 27.
Hardness: Maximum, 188 ppm Dec. 1-15; minimum, 55 ppm June 27.
Specific conductance: Maximum daily, 1,530 micromhos Oct. 7; minimum daily, 160 micromhos June 27.
EXTREMES, 1945-50, 1953-60.--Dissolved solids: Maximum, 1,900 ppm Nov. 7, 1953; minimum, 82 ppm July 31, 1954.
Hardness: Maximum, 258 ppm Oct. 21-31, 1956; minimum, 32 ppm Nov. 1-3, 1953.
Specific conductance: Maximum daily, 3,800 micromhos Oct. 30, 1956; minimum daily, 103 micromhos Nov. 9, 1946.
Water temperatures (1953-58): Maximum, 98°F July 18, 27, 1953; minimum, 38°F Jan. 18, 1956.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C): Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1-7, 1959 | 1,097 | 14 | | 59 | 7.3 | 186 | 7.5 | 181 | 88 | 252 | | 3.2 | | 719 | 0.98 | 2,130 | 177 | 28 | 68 | 6.1 | 1,280 | 7.3 |
| Oct. 8-9 | 6,675 | -- | | -- | -- | -- | | 175 | -- | 78 | | -- | | -- | -- | -- | 131 | 0 | -- | -- | 701 | 7.5 |
| Oct. 10-20 | 16,090 | 18 | | 40 | 3.6 | 24 | | 126 | 23 | 27 | | 1.8 | | a199 | .27 | 8,650 | 115 | 12 | 31 | 1.0 | 362 | 7.2 |
| Oct. 21-31 | 8,389 | 17 | | 46 | 4.8 | 40 | | 143 | 42 | 41 | | 2.8 | | 270 | .37 | 6,120 | 134 | 18 | 39 | 1.5 | 436 | 7.3 |
| Nov. 1-5 | 7,152 | 16 | | 28 | 3.0 | 28 | | 88 | 21 | 33 | | 2.2 | | a174 | .24 | 3,360 | 82 | 10 | 42 | 1.3 | 295 | 7.9 |
| Nov. 6-10 | 7,004 | 14 | | 34 | 4.2 | 50 | | 98 | 27 | 71 | | 2.2 | | a250 | .34 | 4,730 | 102 | 22 | 51 | 2.2 | 445 | 7.8 |
| Nov. 11-19 | 3,429 | 17 | | 46 | 5.6 | 51 | | 132 | 46 | 63 | | 3.5 | | 317 | .43 | 2,930 | 138 | 30 | 44 | 1.9 | 510 | 7.4 |
| Nov. 20-30 | 1,769 | 16 | | 51 | 6.3 | 57 | | 141 | 44 | 80 | | 2.2 | | 352 | .48 | 1,680 | 153 | 38 | 45 | 2.0 | 572 | 7.6 |
| Dec. 1-15 | 1,359 | 16 | | 64 | 6.8 | 93 | | 171 | 62 | 129 | | 3.8 | | 468 | .64 | 1,720 | 188 | 48 | 52 | 2.9 | 801 | 7.4 |
| Dec. 16-21 | 19,270 | 11 | | 27 | 2.7 | 37 | | 70 | 28 | 51 | | 2.0 | | a193 | .26 | 10,040 | 78 | 21 | 51 | 1.8 | 343 | 7.2 |
| Dec. 22-31 | 18,890 | 12 | | 42 | 3.9 | 31 | | 121 | 40 | 33 | | 2.2 | | 241 | .33 | 12,290 | 121 | 22 | 36 | 1.2 | 389 | 7.6 |
| Jan. 1-10, 1960 | 17,000 | 11 | | 44 | 4.0 | 28 | | 102 | 39 | 44 | | 2.2 | | 244 | .33 | 11,200 | 126 | 43 | 33 | 1.1 | 393 | 6.6 |
| Jan. 11-20 | 22,520 | 13 | | 43 | 3.7 | 24 | | 110 | 37 | 32 | | 2.2 | | 228 | .31 | 13,860 | 122 | 32 | 30 | .9 | 360 | 6.8 |
| Jan. 21-31 | 21,840 | 14 | | 42 | 4.2 | 28 | | 115 | 35 | 36 | | 1.8 | | 236 | .32 | 13,920 | 122 | 28 | 33 | 1.1 | 371 | 7.3 |
| Feb. 1-10 | 10,310 | 12 | | 48 | 5.4 | 40 | | 130 | 48 | 50 | | 3.2 | | 290 | .39 | 8,070 | 142 | 36 | 38 | 1.5 | 469 | 7.2 |
| Feb. 11-24 | 10,460 | 11 | | 43 | 4.2 | 32 | | 115 | 40 | 40 | | 4.0 | | a231 | .31 | 6,520 | 125 | 31 | 36 | 1.2 | 411 | 7.1 |
| Feb. 25-29 | 20,980 | 9.0 | | 20 | 1.7 | 13 | | 49 | 15 | 19 | | 1.5 | | a103 | .14 | 5,830 | 56 | 16 | 33 | .8 | 198 | 6.9 |
| Mar. 1-10 | 13,860 | 9.8 | | 36 | 4.7 | 42 | | 97 | 43 | 53 | | 3.0 | | a240 | .33 | 8,980 | 110 | 30 | 46 | 1.7 | 429 | 7.0 |
| Mar. 11-17 | 5,751 | 13 | | 44 | 5.8 | 44 | | 110 | 60 | 53 | | 2.2 | | 293 | .40 | 4,550 | 134 | 44 | 41 | 1.7 | 479 | 7.2 |
| Mar. 18-31 | 3,896 | 13 | | 58 | 7.9 | 62 | | 141 | 77 | 81 | | 4.0 | | 395 | .54 | 4,160 | 177 | 62 | 43 | 2.0 | 651 | 7.2 |
| Apr. 1-10 | 3,011 | 14 | | 58 | 8.6 | 82 | 4.9 | 153 | 76 | 111 | | 4.8 | | 474 | .64 | 3,850 | 180 | 54 | 49 | 2.7 | 753 | 7.5 |
| Apr. 11-22 | 1,842 | 11 | | 56 | 8.1 | 86 | | 155 | 64 | 118 | | 1.2 | | 448 | .61 | 2,230 | 173 | 46 | 52 | 2.8 | 742 | 7.6 |
| Apr. 23-29 | 1,750 | 9.6 | | 58 | 8.4 | 114 | | 159 | 73 | 156 | | 1.2 | | 541 | .74 | 2,560 | 179 | 48 | 58 | 3.7 | 889 | 7.5 |
| Apr. 30 | 9,590 | 15 | | 44 | 3.6 | 59 | | 140 | 37 | 70 | | 3.8 | | a301 | .41 | 7,790 | 126 | 12 | 50 | 2.3 | 520 | 7.4 |
| May 1-3 | 12,330 | 12 | | 25 | 2.5 | 43 | | 69 | 36 | 50 | | 2.0 | | a204 | .28 | 6,790 | 73 | 16 | 56 | 2.2 | 352 | 7.0 |
| May 4-15 | 4,182 | 16 | | 56 | 6.2 | 85 | | 145 | 84 | 99 | | 5.0 | | 434 | .59 | 4,900 | 165 | 46 | 53 | 2.9 | 733 | 7.4 |
| May 16-31 | 2,362 | 8.0 | | 48 | 5.4 | 68 | | 139 | 49 | 87 | | 2.2 | | a336 | .46 | 2,140 | 142 | 28 | 51 | 2.5 | 601 | 7.3 |
| June 1-14 | 1,257 | 9.0 | | 54 | 6.9 | 98 | | 164 | 59 | 128 | | .5 | | 460 | .63 | 1,560 | 163 | 28 | 57 | 3.3 | 782 | 7.2 |
| June 15-24 | 1,589 | 15 | | 55 | 6.8 | 98 | | 170 | 54 | 128 | | 2.0 | | 469 | .64 | 2,010 | 165 | 26 | 56 | 3.3 | 780 | 7.2 |
| June 25-26 | 5,840 | -- | | -- | -- | -- | | 92 | -- | 73 | | -- | | -- | -- | -- | 87 | 12 | -- | -- | 417 | 7.3 |
| June 27 | 27,300 | 8.6 | | 19 | 2.0 | 10 | | 59 | 14 | 9.0 | | 2.0 | | a94 | .13 | 6,930 | 55 | 6 | 29 | .6 | 160 | 6.9 |
| June 28-30, July 1-3 | 11,270 | 14 | | 21 | 3.0 | 30 | | 62 | 23 | 38 | | 1.8 | | a161 | .22 | 4,900 | 65 | 14 | 50 | 1.6 | 284 | 7.2 |
| July 4 | 4,180 | -- | | -- | -- | -- | | 130 | -- | 292 | | -- | | -- | -- | -- | 136 | 30 | -- | -- | 1,250 | 7.4 |
| July 5-19 | 1,218 | 18 | | 46 | 5.7 | 51 | | 137 | 42 | 65 | | 2.2 | | 318 | .43 | 1,050 | 138 | 26 | 44 | 1.9 | 514 | 7.2 |
| July 20-31 | 1,743 | 14 | | 46 | 6.0 | 87 | | 142 | 63 | 101 | | 4.8 | | 417 | .57 | 1,960 | 140 | 23 | 58 | 3.2 | 687 | 7.1 |
| Aug. 1-12 | 584 | 22 | | 53 | 5.8 | 88 | | 168 | 44 | 116 | | .5 | | 428 | .58 | 675 | 156 | 18 | 55 | 3.1 | 722 | 7.8 |
| Aug. 13-19, 21-22, 27 | 928 | 20 | | 42 | 3.3 | 59 | | 130 | 26 | 78 | | 3.2 | | 320 | .44 | 802 | 118 | 12 | 52 | 2.4 | 519 | 7.5 |
| Aug. 20, 23-26, 28-31 | 3,696 | 17 | | 48 | 5.0 | 89 | | 149 | 57 | 106 | | 5.1 | | 422 | .57 | 4,210 | 140 | 18 | 58 | 3.3 | 707 | 7.5 |
| Sept. 1-9 | 1,670 | 18 | | 43 | 4.3 | 59 | | 126 | 41 | 74 | | 2.8 | | 318 | .43 | 1,430 | 125 | 22 | 51 | 2.3 | 530 | 7.6 |
| Sept. 10-18 | 650 | 14 | | 64 | 5.9 | 104 | | 190 | 55 | 140 | | .8 | | 488 | .66 | 856 | 184 | 28 | 55 | 3.3 | 844 | 7.8 |
| Sept. 19-26 | 695 | 16 | | 36 | 3.9 | 78 | | 124 | 45 | 89 | | 1.5 | | 358 | .49 | 672 | 106 | 4 | 61 | 3.3 | 589 | 7.5 |
| Sept. 27-30 | 1,375 | 5.4 | | 51 | 6.3 | 130 | | 182 | 58 | 161 | | .2 | | a501 | .68 | 1,860 | 153 | 4 | 65 | 4.6 | 914 | 7.6 |
| Weighted average | 6,621 | 13 | | 41 | 4.3 | 40 | | 113 | 40 | 51 | | 2.5 | | 259 | 0.35 | 4,630 | 120 | 28 | 42 | 1.6 | 434 | -- |

a Calculated from determined constituents.

671. TRINITY RIVER NEAR MOSS BLUFF, TEX.

LOCATION.--At Devers Pumping Plant Number One, one mile west of Moss Bluff, Liberty County.
RECORDS AVAILABLE.--Chemical analyses: Short periods during summers of 1946 to 1949, daily records October 1949 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 604 ppm Oct. 1-12; minimum, 125 ppm June 26-30.
Hardness: Maximum, 192 ppm Dec. 1-13; minimum, 61 ppm May 6-8.
Specific conductance: Maximum daily, 1,360 micromhos Oct. 10; minimum daily, 183 micromhos June 29-30.
EXTREMES, 1949-60.--Dissolved solids: Maximum, 3,930 ppm Aug. 26-31, 1956; minimum, 110 ppm Oct. 4-10, 1949.
Hardness: Maximum, 790 ppm Aug. 26-31, 1956; minimum, 40 ppm Apr. 9-13, 1955.
Specific conductance: Maximum daily, 7,630 micromhos Aug. 27, 1952; minimum daily, 127 micromhos Oct. 7, 1949.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-12, 1959 | | 14 | | 58 | 7.2 | 148 | 7.1 | 189 | 64 | 199 | 0.5 | 2.0 | | 604 | 0.82 | | 174 | 19 | 64 | 4.9 | 1,060 | 7.1 |
| Oct. 13-21 | | 15 | | 42 | 3.9 | 25 | | 127 | 35 | 24 | -- | 2.0 | | 228 | .31 | | 121 | 17 | 31 | 1.0 | 364 | 7.1 |
| Oct. 22-31 | | 16 | | 44 | 4.0 | 32 | | 134 | 31 | 37 | -- | 2.0 | | 251 | .34 | | 126 | 16 | 36 | 1.2 | 408 | 7.0 |
| Nov. 1-10 | | 13 | | 36 | 2.9 | 43 | | 112 | 28 | 51 | -- | 3.0 | | 246 | .33 | | 102 | 10 | 48 | 1.8 | 405 | 8.1 |
| Nov. 11-22 | | 15 | | 44 | 4.1 | 51 | | 130 | 44 | 59 | -- | 3.5 | | 298 | .41 | | 127 | 20 | 47 | 2.0 | 492 | 7.4 |
| Nov. 23-30 | | 19 | | 54 | 5.0 | 69 | | 156 | 45 | 90 | -- | 3.0 | | 383 | .52 | | 155 | 27 | 49 | 2.4 | 636 | 7.3 |
| Dec. 1-13 | | 14 | | 66 | 6.8 | 92 | | 186 | 63 | 122 | -- | 3.2 | | 466 | .63 | | 192 | 40 | 51 | 2.9 | 802 | 7.2 |
| Dec. 14-31 | | 13 | | 35 | 3.0 | 28 | | 96 | 32 | 33 | -- | 2.5 | | a194 | .26 | | 100 | 21 | 38 | 1.2 | 331 | 7.3 |
| Jan. 1-15, 1960 | | 12 | | 40 | 3.9 | 31 | | 108 | 37 | 39 | -- | 2.0 | | 234 | .32 | | 116 | 27 | 37 | 1.3 | 376 | 7.4 |
| Jan. 17-31 | | 12 | | 40 | 3.8 | 27 | | 114 | 34 | 31 | -- | 2.2 | | 217 | .30 | | 115 | 22 | 34 | 1.1 | 351 | 7.4 |
| Feb. 1-10 | | 13 | | 45 | 4.8 | 38 | | 124 | 42 | 48 | .2 | 2.2 | | 265 | .36 | | 132 | 30 | 39 | 1.4 | 429 | 7.7 |
| Feb. 11-21 | | 12 | | 44 | 4.3 | 43 | | 122 | 40 | 54 | .2 | 2.8 | | 269 | .37 | | 128 | 28 | 42 | 1.7 | 442 | 7.5 |
| Feb. 22-29 | | 9.6 | | 29 | 2.6 | 26 | | 81 | 26 | 32 | .2 | 1.2 | | a167 | .23 | | 83 | 17 | 41 | 1.2 | 285 | 7.4 |
| Mar. 1-10 | | 10 | | 31 | 4.2 | 35 | | 79 | 40 | 44 | -- | 2.0 | | a205 | .28 | | 95 | 30 | 44 | 1.6 | 360 | 7.0 |
| Mar. 11-16, 18 | | 9.4 | | 39 | 4.7 | 37 | | 110 | 39 | 46 | -- | 2.0 | | 258 | .35 | | 117 | 26 | 41 | 1.5 | 410 | 7.0 |
| Mar. 19-31 | | 13 | | 56 | 7.5 | 66 | | 144 | 68 | 87 | -- | 3.2 | | 401 | .55 | | 170 | 32 | 46 | 2.2 | 661 | 7.0 |
| Apr. 1-8, 10 | | 13 | | 55 | 8.0 | 72 | 5.2 | 146 | 71 | 96 | -- | 4.5 | | 412 | .56 | | 170 | 50 | 47 | 2.4 | 696 | 7.3 |
| Apr. 11-20 | | 9.6 | | 62 | 8.5 | 81 | | 173 | 69 | 106 | -- | 2.2 | | 436 | .59 | | 190 | 48 | 48 | 2.6 | 755 | 7.4 |
| Apr. 21-23, 25-29 | | 4.8 | | 55 | 7.9 | 89 | | 164 | 61 | 116 | -- | .8 | | 426 | .58 | | 170 | 35 | 53 | 3.0 | 753 | 7.4 |
| May 1-5 | | 17 | | 44 | 6.1 | 89 | | 124 | 69 | 106 | -- | 6.4 | | 426 | .58 | | 135 | 34 | 59 | 3.3 | 709 | 7.2 |
| May 6-8 | | 12 | | 21 | 2.0 | 32 | | 69 | 24 | 34 | -- | 1.2 | | a160 | .22 | | 61 | 4 | 54 | 1.8 | 276 | 6.9 |
| May 9-20 | | 14 | | 54 | 5.9 | 62 | | 154 | 58 | 73 | -- | 4.8 | | 369 | .50 | | 159 | 33 | 46 | 2.1 | 614 | 7.3 |
| May 21-31 | | 10 | | 52 | 5.8 | 60 | | 153 | 54 | 71 | -- | 3.8 | | 346 | .47 | | 154 | 28 | 46 | 2.1 | 586 | 7.1 |
| June 1-12 | | 9.2 | | 60 | 6.9 | 91 | | 177 | 51 | 125 | -- | 1.0 | | 454 | .62 | | 178 | 33 | 53 | 3.0 | 789 | 7.1 |
| June 13-25 | | 5.8 | | 51 | 6.2 | 100 | | 151 | 67 | 125 | -- | 1.2 | | 460 | .63 | | 152 | 29 | 59 | 3.5 | 792 | 7.0 |
| June 26-30 | | 10 | | 22 | 1.9 | 19 | | 73 | 15 | 20 | -- | 1.2 | | a125 | .17 | | 63 | 3 | 40 | 1.0 | 217 | 6.8 |
| July 1-15 | | 14 | | 42 | 5.3 | 80 | | 132 | 38 | 107 | -- | 3.2 | | 384 | .52 | | 127 | 19 | 58 | 3.1 | 636 | 7.0 |
| July 16-31 | | 15 | | 46 | 5.8 | 73 | | 141 | 48 | 93 | -- | 2.5 | | 378 | .51 | | 139 | 24 | 53 | 2.7 | 626 | 7.0 |
| Aug. 1, 3-5, 7-16 | | 13 | | 52 | 5.5 | 86 | | 160 | 45 | 114 | -- | 1.0 | | 411 | .56 | | 152 | 21 | 55 | 3.0 | 699 | 7.7 |
| Aug. 17-20, 25-31 | | 9.6 | | 22 | 2.0 | 59 | | 73 | 29 | 71 | -- | 1.5 | | a230 | .31 | | 63 | 3 | 67 | 3.2 | 414 | 6.8 |
| Aug. 21-24 | | 12 | | 42 | 4.3 | 95 | | 119 | 49 | 127 | -- | 1.8 | | 413 | .56 | | 122 | 25 | 63 | 3.7 | 693 | 7.0 |
| Sept. 1-8 | | 14 | | 38 | 4.0 | 54 | | 113 | 32 | 71 | -- | 3.8 | | 287 | .39 | | 111 | 19 | 51 | 2.2 | 489 | 7.2 |
| Sept. 9-19 | | 17 | | 48 | 4.8 | 55 | | 146 | 30 | 76 | -- | 2.5 | | 312 | .42 | | 140 | 20 | 46 | 2.0 | 544 | 7.4 |
| Sept. 20-30 | | 15 | | 34 | 6.2 | 92 | | 162 | 37 | 133 | -- | .5 | | 432 | .59 | | 160 | 27 | 55 | 3.2 | 765 | 7.3 |

a Calculated from determined constituents.

## 672. OLD RIVER NEAR COVE, TEX.

LOCATION.--At Barber Hill Pumping Plant, 5 miles northwest of Cove, Chambers County.
RECORDS AVAILABLE.--Chemical analyses: Short periods during summers of 1946 to 1949, daily records October 1949 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 822 ppm June 1-6; minimum, 145 ppm June 26-29.
Hardness: Maximum, 240 ppm June 1-6; minimum, 58 ppm June 26-29.
Specific conductance: Maximum daily, 1,430 micromhos June 3-5; minimum daily, 197 micromhos June 27.
EXTREMES, 1949-60.--Dissolved solids: Maximum, 11,300 ppm Oct. 14-29, 1956; minimum, 77 ppm Apr. 29, May 1-2, 1957.
Hardness: Maximum, 2,460 ppm Oct. 14-29, 1956; minimum, 34 ppm Apr. 29, May 1-2, 1957.
Specific conductance: Maximum daily, 18,000 micromhos Oct. 15, 17, 1956; minimum daily, 101 micromhos Apr. 29, 1957.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-9, 1959 | | 23 | | 54 | 8.0 | 89 | | 157 | 43 | 131 | 0.3 | 1.0 | | 428 | 0.58 | | 168 | 39 | 53 | 3.0 | 720 | 8.0 |
| Oct. 10-14 | | 19 | | 71 | 14 | 162 | | 150 | 60 | 282 | .3 | 3.8 | | 739 | 1.01 | | 234 | 112 | 60 | 4.6 | 1,240 | 7.9 |
| Oct. 15-31 | | 19 | | 28 | 4.3 | 35 | | 88 | 21 | 49 | .3 | .8 | | a200 | .27 | | 88 | 15 | 47 | 1.6 | 336 | 7.7 |
| Nov. 1-15 | | 18 | | 40 | 5.3 | 41 | | 127 | 26 | 56 | .3 | .8 | | 267 | .36 | | 122 | 18 | 43 | 1.6 | 426 | 7.9 |
| Nov. 16-30 | | 18 | | 44 | 6.0 | 54 | | 138 | 35 | 70 | .3 | 2.2 | | 308 | .42 | | 134 | 22 | 46 | 2.0 | 503 | 8.0 |
| Dec. 1-19 | | 17 | | 54 | 6.6 | 72 | | 161 | 41 | 101 | -- | 1.5 | | 388 | .53 | | 162 | 30 | 49 | 2.5 | 655 | 7.9 |
| Dec. 20-31 | | 12 | | 24 | 2.6 | 30 | | 72 | 20 | 39 | -- | .5 | | a163 | .22 | | 71 | 12 | 48 | 1.5 | 279 | 7.3 |
| Jan. 1-15, 1960 | | 13 | | 26 | 3.5 | 32 | | 79 | 18 | 46 | .3 | .8 | | a179 | .24 | | 80 | 14 | 47 | 1.6 | 306 | 7.6 |
| Jan. 16-18, 20-31 | | 13 | | 29 | 3.6 | 33 | | 90 | 16 | 47 | .3 | .8 | | a187 | .25 | | 87 | 13 | 45 | 1.5 | 323 | 7.6 |
| Feb. 1-10 | | 9.4 | | 30 | 3.4 | 34 | | 91 | 16 | 50 | .3 | .8 | | a189 | .26 | | 89 | 14 | 46 | 1.6 | 334 | 7.5 |
| Feb. 11-19 | | 7.8 | | 26 | 3.1 | 32 | | 77 | 14 | 48 | .3 | .8 | | a170 | .23 | | 78 | 14 | 47 | 1.6 | 301 | 7.3 |
| Feb. 20-29 | | 15 | | 22 | 3.2 | 27 | | 76 | 12 | 35 | .3 | 1.5 | | a153 | .21 | | 68 | 6 | 46 | 1.4 | 257 | 7.2 |
| Mar. 1-15 | | 17 | | 30 | 4.3 | 36 | | 103 | 14 | 49 | .3 | 1.2 | | 212 | .29 | | 93 | 8 | 45 | 1.6 | 341 | 7.3 |
| Mar. 16-21, 23-31 | | 25 | | 38 | 5.2 | 44 | | 130 | 18 | 60 | .5 | 1.0 | | 268 | .36 | | 116 | 10 | 45 | 1.8 | 421 | 7.8 |
| Apr. 1-14 | | 33 | | 49 | 6.9 | 57 | | 155 | 36 | 77 | -- | 1.8 | | 360 | .49 | | 151 | 24 | 45 | 2.0 | 550 | 7.8 |
| Apr. 15-30 | | 21 | | 66 | 9.9 | 96 | | 180 | 71 | 135 | -- | 2.0 | | 524 | .71 | | 205 | 58 | 50 | 2.9 | 838 | 7.7 |
| May 1-15 | | 15 | | 52 | 7.5 | 78 | | 136 | 55 | 113 | -- | 2.5 | | 418 | .57 | | 160 | 49 | 51 | 2.7 | 682 | 7.4 |
| May 16-31 | | 17 | | 60 | 8.6 | 90 | | 152 | 72 | 126 | -- | 3.5 | | 478 | .65 | | 185 | 60 | 51 | 2.9 | 777 | 7.6 |
| June 1-6 | | 14 | | 70 | 16 | 192 | | 159 | 83 | 312 | -- | 1.8 | | 822 | 1.12 | | 240 | 110 | 63 | 5.4 | 1,380 | 7.3 |
| June 7-16 | | 17 | | 59 | 11 | 129 | | 177 | 62 | 186 | -- | 1.2 | | 577 | .78 | | 192 | 47 | 59 | 4.1 | 973 | 7.7 |
| June 17-25 | | 15 | | 60 | 8.2 | 100 | | 179 | 62 | 134 | -- | 1.5 | | 496 | .67 | | 183 | 36 | 54 | 3.2 | 818 | 7.4 |
| June 26-29 | | 16 | | 18 | 3.1 | 27 | | 62 | 18 | 32 | -- | 1.2 | | a145 | .20 | | 58 | 7 | 50 | 1.5 | 238 | 7.2 |
| June 30, July 1-10 | | 14 | | 32 | 4.6 | 38 | | 107 | 21 | 50 | -- | 1.2 | | a214 | .29 | | 99 | 11 | 45 | 1.7 | 366 | 7.2 |
| July 11-20 | | 18 | | 39 | 5.1 | 44 | | 129 | 24 | 58 | -- | 1.8 | | 272 | .37 | | 118 | 13 | 45 | 1.8 | 432 | 7.5 |
| July 21-31 | | 12 | | 46 | 6.1 | 63 | | 152 | 31 | 84 | -- | 1.2 | | 342 | .47 | | 140 | 16 | 49 | 2.3 | 562 | 7.4 |
| Aug. 1-10 | | 15 | | 50 | 9.1 | 127 | | 144 | 48 | 192 | -- | 1.5 | | 542 | .74 | | 162 | 44 | 63 | 4.3 | 927 | 7.1 |
| Aug. 11-22 | | 15 | | 47 | 7.6 | 85 | | 173 | 27 | 116 | -- | 1.0 | | 410 | .56 | | 149 | 7 | 55 | 3.0 | 682 | 7.3 |
| Aug. 23-29 | | 16 | | 36 | 5.2 | 59 | | 170 | 15 | 60 | -- | 1.2 | | a276 | .38 | | 111 | 0 | 54 | 2.4 | 478 | 7.4 |
| Aug. 30-31 | | -- | | -- | -- | -- | | 170 | -- | 61 | -- | -- | | -- | -- | | 109 | 0 | -- | -- | 475 | 7.7 |
| Sept. 1-10 | | 16 | | 42 | 5.4 | 73 | | 156 | 27 | 91 | -- | 1.5 | | 352 | .48 | | 127 | 0 | 56 | 2.8 | 583 | 7.5 |
| Sept. 11-20 | | 13 | | 46 | 5.8 | 83 | | 162 | 36 | 105 | -- | 1.0 | | 384 | .52 | | 139 | 6 | 56 | 3.1 | 652 | 7.8 |
| Sept. 22-30 | | 11 | | 50 | 6.1 | 73 | | 168 | 30 | 99 | -- | .5 | | 364 | .50 | | 150 | 12 | 51 | 2.6 | 629 | 7.7 |

a Calculated from determined constituents.

673. TRINITY RIVER AT ANAHUAC, TEX.

LOCATION.--At Lone Star Pumping Plant in Anahuac, Chambers County.
RECORDS AVAILABLE.--Chemical analyses: Short periods during summers of 1946 to 1949, December 1949 to September 1960.
EXTREMES, 1949-56.--Dissolved solids: Maximum, 18,400 ppm Aug. 1-13, 1956; minimum, 140 ppm Apr. 12-19, 1955.
Hardness: Maximum, 3,550 ppm Oct. 21-31, 1952; minimum, 45 ppm Apr. 12-19, 1955.
Specific conductance: Maximum daily, 33,700 micromhos Sept. 26, 1956; minimum daily, 199 micromhos Apr. 15, 1955.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 5, 1959 | | -- | | -- | -- | | -- | 156 | -- | 198 | -- | -- | | -- | -- | | 155 | 27 | -- | -- | 942 | 8.2 |
| Oct. 17 | | -- | | -- | -- | | -- | 119 | -- | 28 | -- | -- | | -- | -- | | 114 | 16 | -- | -- | 346 | 8.2 |
| Oct. 22 | | -- | | -- | -- | | -- | 145 | -- | 46 | -- | -- | | -- | -- | | 125 | 6 | -- | -- | 421 | 8.2 |
| Oct. 29 | | -- | | -- | -- | | -- | 138 | -- | 66 | -- | -- | | -- | -- | | 130 | 17 | -- | -- | 492 | 8.2 |
| Nov. 4 | | -- | | -- | -- | | -- | 126 | -- | 57 | -- | -- | | -- | -- | | 113 | 10 | -- | -- | 433 | 8.2 |
| Nov. 12 | | -- | | -- | -- | | -- | 100 | -- | 77 | -- | -- | | -- | -- | | 98 | 16 | -- | -- | 457 | 8.2 |
| Nov. 22 | | -- | | -- | -- | | -- | 135 | -- | 154 | -- | -- | | -- | -- | | 159 | 48 | -- | -- | 820 | 8.2 |
| Nov. 26 | | -- | | -- | -- | | -- | 151 | -- | 100 | -- | -- | | -- | -- | | 150 | 26 | -- | -- | 654 | 8.2 |
| Jan. 1, 1960 | | -- | | -- | -- | | -- | 73 | -- | 107 | -- | -- | | -- | -- | | 88 | 28 | -- | -- | 507 | 7.9 |
| Jan. 7 | | -- | | -- | -- | | -- | 101 | -- | 56 | -- | -- | | -- | -- | | 110 | 27 | -- | -- | 414 | 7.8 |
| Jan. 14 | | -- | | -- | -- | | -- | 120 | -- | 37 | -- | -- | | -- | -- | | 116 | 18 | -- | -- | 389 | 7.8 |
| Jan. 21 | | -- | | -- | -- | | -- | 109 | -- | 46 | -- | -- | | -- | -- | | 115 | 26 | -- | -- | 398 | 7.7 |
| Jan. 28 | | -- | | -- | -- | | -- | 121 | -- | 41 | -- | -- | | -- | -- | | 118 | 19 | -- | -- | 388 | 7.8 |
| Feb. 4 | | -- | | -- | -- | | -- | 128 | -- | 55 | -- | -- | | -- | -- | | 137 | 32 | -- | -- | 450 | 7.9 |
| Feb. 11 | | -- | | -- | -- | | -- | 116 | -- | 64 | -- | -- | | -- | -- | | 127 | 32 | -- | -- | 470 | 7.7 |
| Feb. 18 | | -- | | -- | -- | | -- | 128 | -- | 57 | -- | -- | | -- | -- | | 135 | 30 | -- | -- | 461 | 7.8 |
| Feb. 25 | | -- | | -- | -- | | -- | 102 | -- | 55 | -- | -- | | -- | -- | | 106 | 22 | -- | -- | 417 | 7.6 |
| Mar. 5 | | -- | | -- | -- | | -- | 86 | -- | 56 | -- | -- | | -- | -- | | 102 | 32 | -- | -- | 397 | 7.6 |
| Mar. 10 | | -- | | -- | -- | | -- | 94 | -- | 59 | -- | -- | | -- | -- | | 103 | 26 | -- | -- | 416 | 7.6 |
| Mar. 17 | | -- | | -- | -- | | -- | 110 | -- | 69 | -- | -- | | -- | -- | | 125 | 35 | -- | -- | 496 | 7.7 |
| Mar. 24 | | -- | | -- | -- | | -- | 132 | -- | 99 | -- | -- | | -- | -- | | 157 | 49 | -- | -- | 649 | 7.8 |
| Mar. 31 | | -- | | -- | -- | | -- | 165 | -- | 125 | -- | -- | | -- | -- | | 194 | 59 | -- | -- | 836 | 7.8 |
| Apr. 4 | | -- | | -- | -- | | -- | 129 | -- | 104 | -- | -- | | -- | -- | | 154 | 48 | -- | -- | 684 | 7.8 |
| Apr. 6 | | -- | | -- | -- | | -- | 127 | -- | 110 | -- | -- | | -- | -- | | 156 | 52 | -- | -- | 697 | 8.0 |
| Apr. 9 | | -- | | -- | -- | | -- | 145 | -- | 118 | -- | -- | | -- | -- | | 175 | 56 | -- | -- | 761 | 8.0 |
| Apr. 11 | | -- | | -- | -- | | -- | 144 | -- | 132 | -- | -- | | -- | -- | | 179 | 61 | -- | -- | 818 | 7.9 |
| Apr. 13 | | -- | | -- | -- | | -- | 163 | -- | 180 | -- | -- | | -- | -- | | 198 | 64 | -- | -- | 991 | 8.0 |
| Apr. 15 | | -- | | -- | -- | | -- | 177 | -- | 193 | -- | -- | | -- | -- | | 207 | 62 | -- | -- | 1,060 | 8.0 |
| Apr. 17 | | -- | | -- | -- | | -- | 179 | -- | 158 | -- | -- | | -- | -- | | 198 | 52 | -- | -- | 946 | 8.1 |
| Apr. 20 | | -- | | -- | -- | | -- | 167 | -- | 136 | -- | -- | | -- | -- | | 184 | 47 | -- | -- | 828 | 8.0 |
| Apr. 21 | | -- | | -- | -- | | -- | 176 | -- | 186 | -- | -- | | -- | -- | | 196 | 52 | -- | -- | 991 | 8.0 |
| Apr. 24 | | -- | | -- | -- | | -- | 173 | -- | 173 | -- | -- | | -- | -- | | 196 | 54 | -- | -- | 943 | 8.1 |
| Apr. 27 | | -- | | -- | -- | | -- | 164 | -- | 222 | -- | -- | | -- | -- | | 196 | 62 | -- | -- | 1,100 | 8.0 |
| Apr. 29 | | -- | | -- | -- | | -- | 158 | -- | 190 | -- | -- | | -- | -- | | 186 | 56 | -- | -- | 982 | 8.1 |
| May 2 | | -- | | -- | -- | | -- | 120 | -- | 117 | -- | -- | | -- | -- | | 136 | 38 | -- | -- | 682 | 7.6 |
| May 6 | | -- | | -- | -- | | -- | 95 | -- | 74 | -- | -- | | -- | -- | | 104 | 26 | -- | -- | 494 | 7.6 |
| May 9 | | -- | | -- | -- | | -- | 86 | -- | 101 | -- | -- | | -- | -- | | 96 | 26 | -- | -- | 514 | 7.5 |
| May 11 | | -- | | -- | -- | | -- | 119 | -- | 138 | -- | -- | | -- | -- | | 152 | 54 | -- | -- | 793 | 7.6 |
| May 13 | | -- | | -- | -- | | -- | 127 | -- | 195 | -- | -- | | -- | -- | | 167 | 63 | -- | -- | 974 | 7.8 |
| May 16 | | -- | | -- | -- | | -- | 138 | -- | 97 | -- | -- | | -- | -- | | 155 | 42 | -- | -- | 675 | 7.7 |
| May 18 | | -- | | -- | -- | | -- | 151 | -- | 78 | -- | -- | | -- | -- | | 163 | 40 | -- | -- | 653 | 7.8 |
| May 23 | | -- | | -- | -- | | -- | 141 | -- | 106 | -- | -- | | -- | -- | | 153 | 38 | -- | -- | 674 | 7.7 |
| May 25 | | -- | | -- | -- | | -- | 144 | -- | 197 | -- | -- | | -- | -- | | 183 | 65 | -- | -- | 983 | 7.8 |
| May 27 | | -- | | -- | -- | | -- | 156 | -- | 163 | -- | -- | | -- | -- | | 173 | 45 | -- | -- | 872 | 7.8 |

673. TRINITY RIVER AT ANAHUAC, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| June 1, 3, 6, 20, 27, 1960 | | 14 | | 58 | 9.6 | 152 | | 150 | 61 | 230 | 0.4 | 3.8 | | 623 | 0.85 | | 184 | 61 | 64 | 4.9 | 1,080 | 7.5 |
| June 13, 15, 17 | | 13 | | 81 | 49 | 589 | | 153 | 166 | 980 | .5 | 3.5 | | 1,960 | 2.67 | | 404 | 278 | 76 | 13 | 3,460 | 7.6 |
| June 22, 24 | | 16 | | 74 | 20 | 286 | | 192 | 99 | 442 | .5 | 3.5 | | 1,040 | 1.41 | | 266 | 109 | 70 | 7.6 | 1,830 | 7.9 |
| June 29 | | -- | | -- | -- | -- | | 79 | -- | 43 | -- | -- | | -- | -- | | 76 | 11 | -- | -- | 298 | 7.4 |
| July 1, 4, 6 | | 19 | | 26 | 3.2 | 43 | | 75 | 21 | 61 | .3 | 2.2 | | a213 | .29 | | 78 | 17 | 55 | 21 | 356 | 7.4 |
| July 8, 11, 13, 22, 25, 27, 29 | | 18 | | 46 | 5.4 | 106 | | 126 | 46 | 150 | .4 | 3.2 | | 452 | .61 | | 137 | 34 | 63 | 3.9 | 769 | 7.5 |
| Aug. 1, 3 | | 22 | | 52 | 9.4 | 203 | | 139 | 77 | 292 | -- | 5.0 | | 752 | 1.02 | | 168 | 54 | 72 | 6.8 | 1,280 | 7.7 |
| Aug. 5, 8, 10, 12, 15 | | 14 | | 56 | 10 | 282 | | 148 | 90 | 408 | -- | 4.3 | | 959 | 1.30 | | 180 | 59 | 77 | 9.1 | 1,650 | 7.7 |
| Aug. 17, 19, 22, 24, 29, 31 | | 16 | | 40 | 4.6 | 124 | | 114 | 39 | 179 | -- | 1.8 | | 490 | .67 | | 119 | 26 | 69 | 4.9 | 814 | 7.5 |
| Sept. 2, 5, 7, 9 | | 20 | | 41 | 5.5 | 113 | | 128 | 55 | 145 | -- | 4.5 | | a447 | .61 | | 125 | 20 | 66 | 4.4 | 793 | 7.7 |
| Sept. 12 | | -- | | -- | -- | -- | | 126 | -- | 770 | -- | -- | | -- | -- | | 302 | 198 | -- | -- | 2,840 | 7.3 |
| Sept. 14, 18 | | -- | | -- | -- | -- | | 127 | -- | 405 | -- | -- | | -- | -- | | 194 | 90 | -- | -- | 1,630 | 7.7 |
| Sept. 16 | | -- | | -- | -- | -- | | 127 | -- | 552 | -- | -- | | -- | -- | | 244 | 140 | -- | -- | 2,120 | 7.6 |
| Sept. 21, 23, 28 | | -- | | -- | -- | -- | | 158 | -- | 270 | -- | -- | | -- | -- | | 174 | 44 | -- | -- | 1,220 | 7.7 |
| Sept. 26 | | -- | | -- | -- | -- | | 154 | -- | 540 | -- | -- | | -- | -- | | 256 | 130 | -- | -- | 2,120 | 7.4 |
| Sept. 30 | | -- | | -- | -- | -- | | 184 | -- | 175 | -- | -- | | -- | -- | | 179 | 28 | -- | -- | 936 | 7.4 |

a Calculated from determined constituents.

## 674. TRINITY BAY AT MOUTH OF TRINITY RIVER NEAR ANAHUAC, TEX.

LOCATION.--At four sampling stations in Trinity Bay opposite mouth of Trinity River near Anahuac, Chambers County. Station 2- In Anahuac Channel immediately below delta. Station 3- In Anahuac Channel about 1½ miles southwest of Station 2. Station 6- In Anahuac Channel at south end. Station 7- In Trinity Bay about 1½ miles west of Station 6.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1960.

Specific conductance, micromhos at 25°C, and chloride, in parts per million, water year October 1959 to September 1960

| Date of Collection | Station 2 | | Station 3 | | Station 6 | | Station 7 | |
|---|---|---|---|---|---|---|---|---|
| | Conductance | Chloride | Conductance | Chloride | Conductance | Chloride | Conductance | Chloride |
| Oct. 5, 1959 | 756 | 156 | 744 | 150 | 1,310 | 280 | 1,350 | 305 |
| Oct. 17 | 347 | 26 | 346 | 27 | 346 | 26 | 347 | 27 |
| Oct. 22 | 418 | 44 | 421 | 42 | 419 | 44 | 424 | 44 |
| Oct. 29 | 730 | 133 | 744 | 138 | 734 | 135 | 744 | 137 |
| Nov. 4 | 426 | 57 | 414 | 57 | 419 | 57 | 427 | 56 |
| Nov. 12 | 452 | 77 | 456 | 76 | 458 | 78 | 451 | 76 |
| Nov. 22 | 848 | 165 | 855 | 165 | 1,060 | 232 | 1,050 | 228 |
| Nov. 26 | 736 | 126 | 734 | 125 | 684 | 109 | 7,370 | 2,280 |
| Dec. 3 | 844 | 138 | 838 | 138 | 8,820 | 2,780 | 8,020 | 2,500 |
| Dec. 10 | 1,100 | 205 | 1,100 | 208 | 1,080 | 202 | 1,050 | 195 |
| Dec. 17 | 543 | 93 | 546 | 94 | 589 | 110 | 546 | 95 |
| Jan. 7, 1960 | 437 | 58 | 506 | 85 | 504 | 79 | 422 | 55 |
| Jan. 14 | 436 | 57 | 465 | 71 | 362 | 37 | -- | -- |
| Jan. 21 | 410 | 50 | 461 | 64 | 389 | 47 | 389 | 48 |
| Jan. 28 | 376 | 37 | 379 | 38 | 376 | 38 | 381 | 39 |
| Feb. 1 | -- | -- | 511 | 106 | 502 | 106 | 515 | 110 |
| Feb. 4 | 451 | 53 | 453 | 54 | 462 | 54 | 451 | 53 |
| Feb. 11 | 502 | 63 | 535 | 63 | 470 | 62 | 512 | 70 |
| Feb. 18 | 458 | 57 | 452 | 55 | 509 | 68 | 447 | 56 |
| Feb. 25 | 401 | 50 | 496 | 77 | 400 | 51 | 394 | 51 |
| Mar. 5 | 402 | 54 | 398 | 55 | 399 | 54 | 398 | 55 |
| Mar. 10 | 415 | 58 | 412 | 57 | 412 | 57 | 412 | 58 |
| Mar. 17 | 492 | 68 | 493 | 67 | 491 | 67 | 496 | 66 |
| Mar. 24 | 651 | 98 | 642 | 96 | 628 | 93 | 626 | 93 |
| Mar. 31 | 785 | 113 | 784 | 113 | 784 | 111 | 785 | 111 |
| Apr. 4 | 685 | 103 | 685 | 103 | 680 | 103 | 682 | 103 |
| Apr. 6 | 698 | 111 | 690 | 109 | 693 | 110 | 693 | 110 |
| Apr. 8 | 758 | 119 | 760 | 119 | 759 | 119 | 759 | 119 |
| Apr. 11 | 819 | 135 | 828 | 135 | 832 | 138 | 828 | 138 |
| Apr. 13 | 976 | 170 | 979 | 172 | 991 | 175 | 994 | 178 |
| Apr. 15 | 1,120 | 205 | 1,120 | 205 | 1,130 | 210 | 1,140 | 212 |
| Apr. 17 | 949 | 158 | 943 | 155 | 1,070 | 198 | 1,010 | 178 |
| Apr. 20 | 828 | 135 | 919 | 162 | 1,170 | 235 | 1,560 | 350 |
| Apr. 21 | 949 | 172 | 925 | 168 | 1,770 | 420 | 2,370 | 600 |
| Apr. 24 | 946 | 170 | 957 | 175 | 1,760 | 420 | 1,890 | 480 |
| Apr. 27 | 1,110 | 220 | 1,110 | 220 | 1,670 | 410 | 1,850 | 470 |
| Apr. 29 | 1,240 | 265 | 1,090 | 222 | 1,270 | 272 | 1,660 | 400 |
| May 2 | 702 | 118 | 731 | 126 | 1,330 | 302 | 1,220 | 272 |
| May 4 | 328 | 50 | 408 | 61 | 322 | 47 | 1,030 | 228 |
| May 6 | 500 | 72 | 518 | 75 | 501 | 74 | 490 | 74 |
| May 9 | 837 | 148 | 815 | 139 | 731 | 127 | 724 | 128 |
| May 11 | 819 | 139 | 801 | 139 | 796 | 140 | 813 | 139 |
| May 13 | 971 | 190 | 971 | 195 | 974 | 192 | 971 | 192 |
| May 16 | 653 | 93 | 651 | 93 | 661 | 95 | 653 | 95 |
| May 18 | 660 | 81 | 660 | 79 | 656 | 80 | 658 | 79 |
| May 20 | 655 | 87 | 656 | 85 | 655 | 86 | 653 | 85 |
| May 23 | 726 | 121 | 721 | 121 | 721 | 123 | 721 | 122 |
| May 25 | 877 | 164 | 893 | 171 | 895 | 171 | 820 | 149 |
| May 27 | 881 | 164 | 877 | 166 | 855 | 157 | 855 | 157 |
| May 30 | 937 | 175 | 917 | 170 | 942 | 180 | 966 | 182 |
| June 1 | 975 | 195 | 986 | 198 | 1,060 | 222 | 1,120 | 238 |
| June 3 | 1,440 | 340 | 1,560 | 375 | 1,910 | 480 | -- | -- |
| June 6 | 1,430 | 335 | 1,420 | 332 | 1,910 | 490 | 1,850 | 470 |
| June 8 | 1,660 | 400 | 1,670 | 420 | 1,720 | 430 | 1,750 | 450 |
| June 13 | 4,210 | 1,200 | 4,210 | 1,200 | 4,360 | 1,280 | 4,510 | 1,320 |
| June 15 | 2,770 | 760 | 2,750 | 740 | 3,080 | 850 | 3,370 | 940 |
| June 17 | 4,040 | 1,150 | 4,040 | 1,180 | 5,050 | 1,500 | 5,510 | 1,680 |
| June 20 | 1,160 | 245 | 1,160 | 245 | 1,210 | 255 | 1,210 | 258 |
| June 22 | 1,830 | 440 | 1,780 | 430 | 1,670 | 400 | 1,640 | 390 |
| June 24 | 2,420 | 630 | 2,590 | 690 | 2,750 | 750 | 2,890 | 780 |
| June 27 | 767 | 158 | 755 | 157 | 767 | 159 | 780 | 162 |
| June 29 | 301 | 44 | 298 | 43 | 293 | 41 | 293 | 41 |
| July 1 | -- | -- | -- | -- | -- | -- | 278 | 41 |
| July 6 | 464 | 89 | -- | -- | 469 | 86 | -- | -- |
| July 11 | -- | -- | 771 | 150 | 766 | 148 | -- | -- |
| July 13 | 665 | 119 | 669 | 121 | 747 | 141 | -- | -- |
| July 22 | 828 | 166 | 824 | 167 | 800 | 157 | 786 | 154 |
| July 25 | 688 | 123 | 684 | 124 | 677 | 123 | 677 | 123 |
| July 27 | 650 | 121 | 648 | 121 | 648 | 120 | 648 | 121 |
| July 29 | 776 | 144 | 777 | 144 | 779 | 145 | 785 | 149 |

674. TRINITY BAY AT MOUTH OF TRINITY RIVER NEAR ANAHUAC, TEX.--Continued

Specific conductance, micromhos at 25°C, and chloride, in parts per million, water year October 1959 to September 1960--Continued

| Date of Collection | Station 2 | | Station 3 | | Station 6 | | Station 7 | |
|---|---|---|---|---|---|---|---|---|
| | Conductance | Chloride | Conductance | Chloride | Conductance | Chloride | Conductance | Chloride |
| Aug. 1, 1960 | 1,270 | 285 | 1,270 | 288 | 1,280 | 290 | 1,290 | 298 |
| Aug. 3 | 1,320 | 305 | 1,310 | 305 | 1,310 | 305 | 1,350 | 325 |
| Aug. 5 | 1,700 | 428 | 1,690 | 428 | 1,710 | 432 | 1,720 | 438 |
| Aug. 8 | 1,660 | 412 | 1,660 | 415 | 1,680 | 422 | 1,680 | 420 |
| Aug. 10 | 1,610 | 382 | 1,610 | 382 | 1,640 | 398 | 1,650 | 402 |
| Aug. 12 | 1,870 | 462 | 1,870 | 462 | 1,840 | 452 | 1,830 | 450 |
| Aug. 15 | 1,460 | 350 | 1,450 | 345 | 1,460 | 352 | 1,440 | 342 |
| Aug. 17 | 2,060 | 542 | 1,490 | 368 | 1,490 | 368 | 2,450 | 668 |
| Aug. 19 | 1,080 | 242 | 1,090 | 245 | 1,110 | 250 | 1,100 | 248 |
| Aug. 22 | 992 | 205 | 989 | 205 | 960 | 200 | 949 | 198 |
| Aug. 24 | 833 | 180 | 830 | 180 | 854 | 185 | 875 | 188 |
| Aug. 29 | 727 | 154 | 727 | 155 | 727 | 154 | 727 | 155 |
| Aug. 31 | 674 | 151 | 674 | 153 | 674 | 152 | 674 | 153 |
| Sept. 2 | 844 | 164 | 842 | 165 | 844 | 165 | 842 | 165 |
| Sept. 5 | 815 | 132 | 812 | 132 | 812 | 132 | 817 | 134 |
| Sept. 7 | 634 | 98 | 633 | 98 | 634 | 98 | 641 | 100 |
| Sept. 9 | 863 | 168 | 863 | 168 | 2,050 | 520 | 2,450 | 640 |
| Sept. 12 | 3,000 | 820 | 3,000 | 820 | 2,920 | 800 | 2,500 | 660 |
| Sept. 14 | 2,180 | 570 | 2,170 | 560 | 3,110 | 860 | 3,700 | 1,040 |
| Sept. 16 | 2,530 | 680 | 2,480 | 670 | 4,170 | 1,220 | 6,170 | 1,880 |
| Sept. 18 | 2,600 | 700 | 2,650 | 710 | 1,950 | 500 | 3,820 | 1,090 |
| Sept. 21 | 1,080 | 230 | 1,080 | 230 | 2,090 | 530 | 1,860 | 470 |
| Sept. 23 | 1,240 | 275 | 1,230 | 272 | 1,180 | 258 | 1,210 | 265 |
| Sept. 26 | 4,490 | 1,300 | 4,460 | 1,300 | 4,210 | 1,220 | 7,120 | 2,220 |
| Sept. 28 | 1,200 | 255 | 1,180 | 250 | 1,270 | 275 | 1,290 | 280 |
| Sept. 30 | 956 | 180 | 976 | 190 | 1,440 | 325 | 1,920 | 475 |

MISCELLANEOUS ANALYSES OF STREAMS IN TRINITY RIVER BASIN IN TEXAS

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| LAKE BRIDGEPORT NEAR BRIDGEPORT | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 22, 1960---------- | | 5.0 | 0.20 | 32 | 4.9 | 10 | 4.3 | 109 | 11 | 18 | 0.2 | 0.8 | 0.08 | 140 | 0.19 | | 100 | 11 | 17 | 0.4 | 252 | 7.5 |

## 805. DOUBLE MOUNTAIN FORK BRAZOS RIVER NEAR ASPERMONT, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 83, 8 miles downstream from Mountain Creek, and 10 miles south of Aspermont, Stonewall County.
DRAINAGE AREA.--7,980 square miles, approximately, of which 6,470 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1948 to November 1951, October 1956 to September 1960.
Water temperatures: November 1949 to November 1951, October 1956 to September 1960.
Sediment records: November 1949 to September 1951.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 6,350 ppm Nov. 6; minimum, 674 ppm Dec. 18-21.
Hardness: Maximum, 2,420 ppm May 13-26; minimum, 202 ppm Dec. 18-21.
Specific conductance: Maximum daily, 9,090 micromhos Nov. 6; minimum daily, 897 micromhos July 8.
Water temperatures: Maximum, 95°F July 25, Aug. 24; minimum, freezing point Nov. 13, Feb. 24.
EXTREMES, 1948-51, 1956-60.--Dissolved solids: Maximum, 6,350 ppm Feb. 23-28, 1958, Nov. 6, 1959; minimum, 636 ppm Oct. 22-28, 1957.
Hardness: Maximum, 2,510 ppm Aug. 5, 8, 1951; minimum, 193 ppm Oct. 22-28, 1957.
Specific conductance: Maximum daily, 10,400 micromhos Feb. 25, 1958; minimum daily, 735 micromhos Oct. 24, 1957.
Water temperatures (1949-51, 1956-60): Maximum, 96°F July 20, 1951; minimum, freezing point Jan. 4, 1950, Jan. 29, 1951, Jan. 16, 1957, Nov. 13, 1959, Feb. 24, 1960.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1-2, 9-12, 1959--- | 45.1 | 14 | | 280 | 22 | 329 | 7.7 | 116 | 765 | 460 | | 1.8 | | 1,940 | 2.64 | 236 | 789 | 694 | 47 | 5.1 | 2,810 | 7.8 |
| Oct. 3-8--- | 1,221 | 14 | | 129 | 13 | 146 | | 122 | 379 | 139 | | 2.8 | | a883 | 1.20 | 2,910 | 376 | 276 | 46 | 3.3 | 1,310 | 7.7 |
| Oct. 13-29--- | 11.6 | 16 | | 450 | 68 | 922 | | 121 | 1,280 | 1,400 | | 1.0 | | 4,200 | 5.71 | 132 | 1,400 | 1,300 | 59 | 11 | 5,720 | 7.7 |
| Oct. 30-31--- | 47.0 | 12 | | 378 | 32 | 433 | | 82 | 1,010 | 635 | | 1.5 | | 2,540 | 3.45 | 322 | 1,070 | 1,010 | 47 | 5.8 | 3,580 | 7.8 |
| Nov. 1-2, 5--- | 14.3 | 14 | | 460 | 61 | 789 | | 102 | 1,230 | 1,240 | | 1.0 | | 3,840 | 5.22 | 148 | 1,400 | 1,320 | 55 | 9.2 | 5,620 | 8.0 |
| Nov. 3-4, 7-11--- | 21.0 | 12 | | 420 | 59 | 577 | | 117 | 1,200 | 850 | | 1.0 | | 3,180 | 4.32 | 180 | 1,290 | 1,190 | 49 | 7.0 | 4,300 | 7.6 |
| Nov. 6--- | 20.0 | -- | | -- | -- | -- | | 91 | -- | 2,420 | | -- | | 6,350 | 8.64 | 343 | 1,640 | 1,570 | -- | -- | 9,090 | 7.9 |
| Nov. 12-30--- | 4.69 | 14 | | 580 | 84 | 888 | | 152 | 1,560 | 1,400 | | .5 | | 4,600 | 6.26 | 58.2 | 1,790 | 1,670 | 52 | 9.1 | 6,450 | 8.0 |
| Dec. 1-14--- | 1.10 | 13 | | 670 | 89 | 758 | | 127 | 1,800 | 1,210 | | .5 | | 4,600 | 6.26 | 13.7 | 2,040 | 1,930 | 45 | 7.3 | 6,140 | 7.6 |
| Dec. 15-17, 22--- | 419 | 9.8 | | 152 | 20 | 196 | | 115 | 444 | 232 | | 3.5 | | 1,110 | 1.51 | 1,260 | 461 | 367 | 48 | 4.0 | 1,710 | 7.7 |
| Dec. 18-21--- | 559 | 11 | | 63 | 11 | 158 | | 138 | 204 | 155 | | 3.2 | | 674 | .92 | 1,020 | 202 | 89 | 63 | 4.8 | 1,110 | 8.1 |
| Dec. 23-24--- | 73.0 | 12 | | 138 | 24 | 293 | | 142 | 424 | 370 | | 1.2 | | 1,330 | 1.81 | 262 | 443 | 326 | 59 | 6.1 | 2,120 | 8.0 |
| Dec. 25-27--- | 45.0 | 12 | | 242 | 41 | 493 | | 150 | 708 | 698 | | 1.5 | | 2,270 | 3.09 | 276 | 772 | 650 | 58 | 7.7 | 3,470 | 7.8 |
| Dec. 28-31--- | 30.5 | 13 | | 340 | 55 | 682 | | 156 | 952 | 1,020 | | 1.0 | | 3,140 | 4.27 | 259 | 1,070 | 946 | 58 | 9.1 | 4,730 | 8.0 |
| Jan. 1-9, 1960--- | 29.3 | 12 | | 380 | 67 | 776 | | 136 | 1,060 | 1,200 | | 4.5 | | 3,570 | 4.86 | 282 | 1,220 | 1,110 | 58 | 9.6 | 5,630 | 7.7 |
| Jan. 10-12--- | 22.7 | 14 | | 250 | 49 | 504 | | 142 | 756 | 720 | | 3.5 | | 2,370 | 3.22 | 143 | 826 | 709 | 57 | 7.6 | 3,670 | 7.8 |
| Jan. 13-31--- | 5.39 | 12 | | 435 | 78 | 1,020 | | 150 | 1,250 | 1,550 | | 4.5 | | 4,420 | 6.01 | 64.3 | 1,410 | 1,280 | 61 | 12 | 6,550 | 7.6 |
| Feb. 1-2, 4-15--- | 10.5 | 13 | | 550 | 94 | 1,290 | | 145 | 1,560 | 2,000 | | -- | | 5,580 | 7.59 | 158 | 1,760 | 1,640 | 61 | 13 | 7,780 | 7.8 |
| Feb. 3--- | 72.0 | -- | | -- | -- | -- | | 66 | -- | 445 | | -- | | -- | -- | -- | 950 | 896 | -- | -- | 2,850 | 7.6 |
| Feb. 16-29--- | 3.94 | 13 | | 640 | 105 | 1,150 | | 158 | 1,740 | 1,830 | | .9 | | 5,560 | 7.56 | 59.1 | 2,030 | 1,900 | 55 | 11 | 7,810 | 7.8 |
| Mar. 1-12--- | 3.48 | 12 | | 650 | 98 | 1,080 | | 120 | 1,750 | 2,090 | | -- | | 5,740 | 7.81 | 53.9 | 2,020 | 1,930 | 48 | 10 | 8,350 | 7.5 |
| Mar. 13-23--- | 1.07 | 10 | | 690 | 104 | 1,110 | | 140 | 1,840 | 1,800 | | .0 | | 5,620 | 7.64 | 16.2 | 2,150 | 2,030 | 53 | 10 | 7,660 | 7.6 |
| Mar. 24--- | 15.0 | 11 | | 320 | 20 | 82 | | 116 | 691 | 172 | | 1.2 | | 1,350 | 1.84 | 54.7 | 880 | 786 | 17 | 1.2 | 1,950 | 7.2 |
| Mar. 25--- | 6.40 | -- | | -- | -- | -- | | 78 | -- | 850 | | -- | | -- | -- | -- | 1,100 | 1,040 | -- | -- | 3,830 | 7.7 |
| Mar. 26-31--- | .60 | 8.6 | | 680 | 101 | 826 | | 118 | 1,820 | 1,360 | | .0 | | 4,850 | 6.60 | 7.86 | 2,110 | 2,020 | 46 | 7.8 | 6,490 | 7.5 |
| Apr. 1-15--- | .20 | 4.2 | | 520 | 95 | 620 | | 84 | 1,230 | 1,190 | | 9.5 | | 3,710 | 5.05 | 2.00 | 1,690 | 1,620 | 44 | 6.6 | 5,350 | 6.6 |
| Apr. 16-30--- | b .17 | 8.8 | | 710 | 127 | 819 | | 126 | 1,790 | 1,490 | | 6.0 | | 5,010 | 6.81 | 2.30 | 2,290 | 2,190 | 44 | 7.4 | 6,830 | 6.9 |
| May 1-12--- | .14 | 9.6 | | 700 | 143 | 852 | | 126 | 1,860 | 1,520 | | 5.5 | | 5,150 | 7.00 | 1.95 | 2,330 | 2,230 | 44 | 7.7 | 6,960 | 7.3 |
| May 13-26--- | b .06 | 13 | | 745 | 145 | 821 | | 132 | 2,070 | 1,400 | | 3.0 | | 5,260 | 7.15 | .85 | 2,420 | 2,350 | 42 | 7.2 | 6,910 | 7.6 |
| May 27-31--- | 300 | 13 | | 285 | 32 | 202 | | 114 | 763 | 278 | | 2.0 | | 1,630 | 2.22 | 1,320 | 842 | 749 | 34 | 3.0 | 2,250 | 7.4 |
| June 1-4, 9-12--- | 224 | 22 | | 180 | 20 | 186 | | 117 | 518 | 210 | | 6.2 | | 1,200 | 1.63 | 726 | 531 | 435 | 43 | 3.5 | 1,770 | 7.6 |
| June 5-8, 13-15--- | 3.80 | 23 | | 298 | 34 | 346 | | 100 | 840 | 480 | | 3.8 | | 2,070 | 2.82 | 21.2 | 884 | 802 | 46 | 5.1 | 2,990 | 7.6 |
| June 16-30--- | b .27 | 28 | | 650 | 77 | 603 | | 67 | 1,890 | 870 | | 1.0 | | 4,150 | 5.64 | 3.03 | 1,940 | 1,880 | 40 | 6.0 | 5,200 | 7.5 |
| July 1-5--- | 0 | 72 | | 680 | 109 | 591 | | 58 | 2,030 | 900 | | .0 | | 4,410 | 6.00 | -- | 2,140 | 2,100 | 37 | 5.6 | 5,450 | 7.5 |
| July 6-10--- | 7,037 | 25 | | 114 | 14 | 94 | | 108 | 337 | 73 | | 5.0 | | 746 | 1.01 | 14,170 | 342 | 254 | 37 | 2.2 | 1,060 | 7.6 |
| July 11-20--- | 173 | -- | | -- | -- | -- | | 120 | -- | 332 | | -- | | -- | -- | -- | 420 | 322 | -- | -- | 2,060 | 7.8 |
| July 21-31--- | 32.4 | 45 | | 450 | 79 | 850 | | 67 | 1,350 | 1,300 | | 3.0 | | 4,110 | 5.59 | 360 | 1,450 | 1,390 | 56 | 9.7 | 5,940 | 7.3 |

a Calculated from determined constituents.
b Includes days of less than 0.05 cubic feet per second discharge.

805. DOUBLE MOUNTAIN FORK BRAZOS RIVER NEAR ASPERMONT, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Aug. 1-8, 1960 | 4.14 | 26 | | 585 | 92 | 945 | | 69 | 1,680 | 1,480 | | 0.8 | | 4,840 | 6.58 | 54.1 | 1,840 | 1,780 | 53 | 9.5 | 6,780 | 7.4 |
| Aug. 9-10, 12-13 | 65.8 | 18 | | 410 | 24 | 142 | | 78 | 1,060 | 185 | | 1.5 | | 1,880 | 2.56 | 334 | 1,120 | 1,060 | 22 | 1.8 | 2,350 | 7.6 |
| Aug. 11, 14-17 | 35.1 | 17 | | 450 | 45 | 475 | | 85 | 1,220 | 710 | | 1.0 | | 2,960 | 4.03 | 281 | 1,310 | 1,240 | 44 | 5.7 | 4,090 | 7.5 |
| Aug. 18-29 | 2.37 | 17 | | 645 | 76 | 760 | | 86 | 1,740 | 1,200 | | .5 | | 4,480 | 6.09 | 28.7 | 1,920 | 1,850 | 46 | 7.5 | 6,070 | 7.6 |
| Aug. 30-31 | 11.9 | 13 | | 412 | 32 | 225 | | 67 | 1,070 | 340 | | .8 | | 2,130 | 2.90 | 68.4 | 1,160 | 1,100 | 30 | 2.9 | 2,770 | 7.9 |
| Sept. 1-22 | b .07 | 16 | | 690 | 116 | 625 | | 82 | 1,970 | 1,020 | | .5 | | 4,480 | 6.09 | .85 | 2,200 | 2,130 | 38 | 5.8 | 5,690 | 7.1 |
| Sept. 23-24 | 3.10 | 14 | | 302 | 34 | 129 | | 76 | 764 | 222 | | 3.2 | | 1,510 | 2.05 | 12.6 | 894 | 831 | 24 | 1.9 | 2,020 | 7.4 |
| Sept. 25-28 | 4.82 | 12 | | 495 | 42 | 305 | | 76 | 1,290 | 472 | | .8 | | 2,650 | 3.60 | 34.5 | 1,410 | 1,340 | 32 | 3.5 | 3,420 | 7.5 |
| Sept. 29-30 | .65 | -- | | -- | -- | -- | | 84 | -- | 860 | | -- | | -- | -- | -- | 1,870 | 1,800 | -- | -- | 4,930 | 7.5 |
| Weighted average | 149 | 22 | | 139 | 17 | 151 | | 112 | 410 | 159 | | 4.3 | | 977 | 1.33 | 393 | 417 | 325 | 44 | 3.2 | 1,410 | -- |

b Includes days of less than 0.05 cubic feet per second discharge.

## 812. CROTON CREEK NEAR JAYTON, TEX.

LOCATION.--At gaging station in Stonewall County, 300 feet upstream from county road ford, 1½ miles upstream from mouth and about 8 miles northeast of Jayton, Kent County.
DRAINAGE AREA.--310 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: May 1959 to September 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | | |
| Oct. 6, 1959 | 14.3 | 15 | | 787 | 70 | 1,910 | -- | 78 | 2,050 | 2,960 | | | 7,830 | 10.7 | | 2,250 | 2,190 | 65 | | 11,300 | 7.5 | 1.004 |
| Oct. 14-15 | a .67 | 19 | | 1,040 | 140 | 3,770 | -- | 122 | 2,610 | 6,050 | | | 13,700 | 18.8 | | 3,170 | 3,070 | 72 | | 19,300 | 7.4 | 1.009 |
| Oct. 17 | .20 | -- | | -- | -- | 2,420 | -- | -- | 1,690 | 3,690 | | | -- | -- | | 1,830 | -- | 74 | | 12,600 | -- | 1.003 |
| Oct. 20-22, 30 | a .26 | 15 | | 1,130 | 170 | 4,670 | -- | 146 | 2,720 | 7,720 | | | 16,500 | 22.7 | | 3,520 | 3,400 | 74 | | 23,200 | 7.3 | 1.011 |
| Oct. 27 | 0 | -- | | -- | -- | -- | -- | -- | -- | -- | | | -- | -- | | -- | -- | -- | | 24,100 | -- | -- |
| Nov. 2 | .57 | -- | | -- | -- | 4,760 | -- | -- | 2,510 | 7,810 | | | -- | -- | | 3,420 | -- | 75 | | 23,100 | -- | 1.011 |
| Nov. 3 (12 p.m.-12 m.) | 1.51 | -- | | -- | -- | 3,980 | -- | -- | 2,300 | 6,540 | | | -- | -- | | 2,930 | -- | 75 | | 20,300 | -- | 1.009 |
| Nov. 3 (12 m.-12 p.m.) | 15.6 | -- | | -- | -- | 4,360 | -- | -- | 2,450 | 7,230 | | | -- | -- | | 3,150 | -- | 76 | | 22,200 | -- | 1.010 |
| Nov. 4 | 4.12 | -- | | -- | -- | 4,360 | -- | -- | 2,330 | 6,840 | | | -- | -- | | 2,790 | -- | 77 | | 21,100 | -- | 1.009 |
| Nov. 19 | 0 | -- | | -- | -- | -- | -- | -- | -- | 10,600 | | | -- | -- | | -- | -- | -- | | 28,800 | -- | 1.011 |
| Dec. 2 | 0 | -- | | -- | -- | -- | -- | -- | -- | 11,800 | | | -- | -- | | -- | -- | -- | | 31,900 | -- | 1.013 |
| Dec. 16 (12 p.m.-12 m.) | 78.8 | -- | | -- | -- | -- | -- | -- | 1,660 | 1,800 | | | -- | -- | | -- | -- | -- | | 7,600 | -- | -- |
| Dec. 16 (12 m.-12 p.m.) | 64.4 | -- | | -- | -- | 959 | -- | 92 | 1,540 | 1,440 | | | -- | -- | | 1,660 | 1,580 | 56 | | 6,620 | 7.6 | -- |
| Jan. 5, 1960 | 6.97 | -- | | -- | -- | -- | -- | -- | 2,370 | 8,630 | | | -- | -- | | -- | -- | -- | | 24,400 | -- | 1.008 |
| Jan. 21 | 1.48 | -- | | -- | -- | -- | -- | -- | 3,110 | 12,400 | | | -- | -- | | -- | -- | -- | | 33,300 | -- | 1.014 |
| Feb. 3 | 19.0 | -- | | -- | -- | 6,030 | -- | -- | 2,390 | 9,400 | | | -- | -- | | 2,690 | -- | 83 | | 26,900 | -- | 1.011 |
| Feb. 4 | 21.4 | -- | | -- | -- | 5,010 | -- | -- | 2,260 | 8,030 | | | -- | -- | | 2,700 | -- | 80 | | 23,600 | -- | 1.009 |
| Feb. 17 | 1.05 | -- | | -- | -- | 7,770 | -- | -- | 3,100 | 12,400 | | | -- | -- | | 4,210 | -- | 80 | | 33,300 | -- | 1.016 |
| Mar. 2 | 1.56 | -- | | -- | -- | 8,580 | -- | -- | 3,150 | 13,900 | | | -- | -- | | 4,220 | -- | 82 | | 36,700 | -- | 1.018 |
| Mar. 15 | .82 | -- | | -- | -- | 8,680 | -- | -- | 3,240 | 14,000 | | | -- | -- | | 4,500 | -- | 81 | | 37,300 | -- | 1.018 |
| Mar. 30 | 0 | -- | | -- | -- | -- | -- | -- | -- | 15,200 | | | -- | -- | | -- | -- | -- | | 39,700 | -- | 1.020 |
| Apr. 14 | 0 | -- | | -- | -- | -- | -- | -- | -- | 16,900 | | | -- | -- | | -- | -- | -- | | 39,100 | -- | 1.020 |
| Apr. 15 | 0 | -- | | -- | -- | -- | -- | -- | -- | 17,900 | | | -- | -- | | -- | -- | -- | | 40,800 | -- | 1.022 |
| Apr. 18 | 0 | -- | | -- | -- | -- | -- | -- | -- | 21,700 | | | -- | -- | | -- | -- | -- | | 47,300 | -- | 1.027 |
| Apr. 26 | .25 | -- | | -- | -- | 7,270 | -- | -- | 2,890 | 12,000 | | | -- | -- | | 4,190 | -- | 79 | | 33,300 | -- | 1.014 |
| Apr. 27 (12 p.m.-12 m.) | .05 | -- | | -- | -- | 8,000 | -- | -- | 2,950 | 12,800 | | | -- | -- | | 4,130 | -- | 81 | | 35,100 | -- | 1.016 |
| Apr. 27 (12 m.-12 p.m.) | 7.25 | -- | | -- | -- | 5,580 | -- | -- | 2,610 | 9,100 | | | -- | -- | | 3,660 | -- | 77 | | 26,700 | -- | 1.011 |
| Apr. 28 | .91 | -- | | -- | -- | 11,500 | -- | -- | 3,540 | 18,100 | | | -- | -- | | 4,740 | -- | 84 | | 46,700 | -- | 1.023 |
| May 11 | 0 | -- | | -- | -- | -- | -- | -- | -- | 34,300 | | | -- | -- | | -- | -- | -- | | 76,700 | -- | 1.043 |
| May 30 (12 p.m.-4 p.m.) | a6.94 | -- | | -- | -- | 1,620 | -- | 78 | 1,630 | 2,590 | | | -- | -- | | 1,900 | 1,840 | 65 | | 9,560 | 7.2 | -- |
| May 30 (4 p.m.-12 p.m.) | 25.6 | -- | | -- | -- | 5,940 | -- | -- | 2,780 | 9,190 | | | -- | -- | | 2,980 | -- | 81 | | 26,300 | -- | 1.012 |
| May 31, June 1 | a .16 | -- | | -- | -- | 5,940 | -- | -- | 2,920 | 9,480 | | | -- | -- | | 3,400 | -- | 79 | | 26,500 | -- | 1.013 |
| June 8-10 | a11.2 | -- | | -- | -- | 6,890 | -- | -- | 3,200 | 10,700 | | | -- | -- | | 3,650 | -- | 80 | | 29,600 | -- | 1.015 |
| July 5-6 | a66.1 | -- | | -- | -- | 2,910 | -- | -- | 1,980 | 4,570 | | | -- | -- | | 2,130 | -- | 75 | | 14,800 | -- | 1.006 |
| July 7-8 | a791 | -- | | -- | -- | 269 | 8.5 | 72 | 1,600 | 410 | | | -- | -- | | 1,670 | 1,610 | 26 | | 3,630 | 7.5 | -- |
| July 10-11 | a9.44 | -- | | -- | -- | 1,960 | -- | -- | 2,250 | 3,080 | | | -- | -- | | 2,470 | -- | 63 | | 11,400 | -- | 1.005 |

a Mean daily discharge.

812. CROTON CREEK NEAR JAYTON, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | | |
| July 13, 1960 | 2.33 | -- | | -- | -- | 3,500 | -- | -- | 2,740 | 5,560 | | | -- | -- | | 3,120 | -- | 71 | | 17,800 | -- | 1.008 |
| July 15 | 15.5 | -- | | -- | -- | 1,400 | -- | 72 | 2,100 | 2,040 | | | -- | -- | | 2,150 | 2,090 | 59 | | 8,850 | 7.3 | -- |
| July 16-17 | a4.15 | -- | | -- | -- | 2,330 | -- | -- | 2,450 | 3,600 | | | -- | -- | | 2,600 | -- | 66 | | 12,900 | -- | 1.006 |
| July 19 | .94 | -- | | -- | -- | 3,930 | -- | -- | 2,800 | 6,240 | | | -- | -- | | 3,250 | -- | 72 | | 19,300 | -- | 1.009 |
| July 21 (12 p.m.-10 a.m.) | 56.4 | -- | | -- | -- | 1,810 | -- | 68 | 2,080 | 2,850 | | | -- | -- | | 2,380 | 2,320 | 62 | | 10,600 | 7.4 | -- |
| July 21 (10 a.m.-12 p.m.) | 150 | -- | | -- | -- | 767 | -- | 50 | 1,510 | 1,180 | | | -- | -- | | 1,550 | 1,510 | 52 | | 5,650 | 7.0 | -- |
| Aug. 1 | 0 | -- | | -- | -- | -- | -- | -- | -- | 7,140 | | | -- | -- | | -- | -- | -- | | 22,100 | -- | 1.008 |
| Aug. 20 | 0 | -- | | -- | -- | -- | -- | -- | -- | 21,700 | | | -- | -- | | -- | -- | -- | | 51,200 | -- | 1.026 |
| Aug. 21 | 0 | -- | | -- | -- | 1,230 | 9.1 | 71 | 2,120 | 1,900 | | | -- | -- | | 2,180 | 2,120 | 55 | | 8,470 | 7.7 | -- |
| Aug. 25 (12 p.m.-12 m.) | 46.0 | -- | | -- | -- | 1,540 | 10 | 97 | 2,240 | 2,300 | | | -- | -- | | 2,240 | 2,160 | 60 | | 9,620 | 7.4 | -- |
| Aug. 25 (12 m.-12 p.m.) | 69.1 | -- | | -- | -- | 3,620 | -- | -- | 2,590 | 5,860 | | | -- | -- | | 3,000 | -- | 72 | | 18,300 | -- | 1.007 |
| Aug. 26 | 17.1 | -- | | -- | -- | 837 | 7.4 | 59 | 1,930 | 1,240 | | | -- | -- | | 1,920 | 1,870 | 49 | | 6,400 | 7.6 | -- |
| Aug. 28 | 0 | -- | | -- | -- | -- | -- | -- | -- | 2,600 | | | -- | -- | | -- | -- | -- | | 10,400 | -- | -- |
| Sept. 20 | 20.7 | -- | | -- | -- | 4,100 | -- | -- | 2,580 | 6,350 | | | -- | -- | | 2,740 | -- | 76 | | 19,900 | -- | 1.008 |

a Mean daily discharge.

Note: Values given in this table are expressed in parts per million and should be multiplied by the density, where given, in any computation of loads.

## 814. SALT CROTON CREEK AT WEIR D NEAR ASPERMONT, TEX.

LOCATION.--About 500 feet upstream from Haystack Creek and 1,000 feet upstream from gaging station, about 20 miles northwest of Aspermont, Stonewall County.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1960.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | | |
| Oct. 5, 1959 | 2.26 | | | | | 24,200 | | | 2,500 | 37,800 | | | | | | 4,300 | | 92 | | 76,900 | | 1.046 |
| Oct. 22 | .63 | | | | | 95,600 | | | 3,370 | 150,000 | | | | | | 9,550 | | 96 | | 156,000 | | 1.194 |
| Oct. 27 | .50 | | | | | 100,000 | | | 2,920 | 157,000 | | | | | | 9,150 | | 96 | | 158,000 | | 1.202 |
| Nov. 3 | 11.7 | | | | | 22,100 | | | 1,550 | 34,600 | | | | | | 3,000 | | 94 | | 72,400 | | 1.041 |
| Nov. 20 | .61 | | | | | 91,300 | | | 3,180 | 143,000 | | | | | | 9,040 | | 96 | | 158,000 | | 1.183 |
| Dec. 2 | .65 | | | | | 89,300 | | | 3,280 | 141,000 | | | | | | 8,820 | | 96 | | 158,000 | | 1.179 |
| Dec. 18 | 2.47 | | | | | 27,700 | | | 2,310 | 43,700 | | | | | | 4,180 | | 94 | | 85,900 | | 1.053 |
| Jan. 5, 1960 | -- | | | | | 21,500 | | | 1,800 | 33,700 | | | | | | 3,160 | | 94 | | 71,300 | | 1.039 |
| Jan. 19 | .72 | | | | | 76,600 | | | 3,400 | 121,000 | | | | | | 8,220 | | 95 | | 152,000 | | 1.156 |
| Feb. 17 | 1.36 | | | | | 85,200 | | | 3,140 | 134,000 | | | | | | 8,610 | | 96 | | 155,000 | | 1.173 |
| Mar. 2 | 1.12 | | | | | 83,000 | | | 3,340 | 132,000 | | | | | | 8,570 | | 95 | | 122,000 | | 1.167 |
| Mar. 16 | .44 | | | | | 89,900 | | | 3,570 | 142,000 | | | | | | 9,070 | | 96 | | 157,000 | | 1.180 |
| Mar. 31 | .17 | | | | | 71,300 | | | 3,720 | 112,000 | | | | | | 7,980 | | 95 | | 147,000 | | 1.141 |
| Apr. 14 | .22 | | | | | 98,100 | | | 3,060 | 154,000 | | | | | | 9,100 | | 96 | | 126,000 | | 1.198 |
| Apr. 20 | .47 | | | | | 99,800 | | | 2,880 | 157,000 | | | | | | 9,560 | | 96 | | 178,000 | | 1.203 |
| Apr. 28 | 1.15 | | | | | 77,800 | | | 4,030 | 121,000 | | | | | | 7,950 | | 96 | | 168,000 | | 1.157 |
| May 16 | .54 | | | | | 99,100 | | | 2,530 | 158,000 | | | | | | 9,910 | | 96 | | 146,000 | | 1.201 |
| May 25 | .22 | | | | | 99,300 | | | 2,630 | 158,000 | | | | | | 10,700 | | 95 | | 146,000 | | 1.202 |
| June 3 | .51 | | | | | 71,700 | | | 4,230 | 112,000 | | | | | | 8,640 | | 95 | | 135,000 | | 1.146 |
| June 10 | .68 | | | | | 46,900 | | | 3,630 | 73,100 | | | | | | 6,760 | | 94 | | 112,000 | | 1.095 |
| June 23 | .59 | | | | | 98,800 | | | 2,600 | 158,000 | | | | | | 10,400 | | 93 | | 163,000 | | 1.202 |
| July 1 | .58 | | | | | 98,500 | | | 2,470 | 158,000 | | | | | | 11,100 | | 95 | | 164,000 | | 1.202 |
| July 9 | .16 | | | | | 29,800 | | | 2,970 | 48,100 | | | | | | 5,620 | | 92 | | 92,800 | | 1.060 |
| July 12 | .54 | | | | | 71,800 | | | 4,010 | 114,000 | | | | | | 9,700 | | 94 | | 150,000 | | 1.144 |
| Aug. 4 | .46 | | | | | 101,000 | | | 2,610 | 158,000 | | | | | | 9,970 | | 96 | | 146,000 | | 1.204 |
| Aug. 15 | .63 | | | | | 100,000 | | | 2,770 | 158,000 | | | | | | 9,060 | | 96 | | 163,000 | | 1.203 |
| Aug. 23 | .79 | | | | | 83,800 | | | 3,780 | 132,000 | | | | | | 8,980 | | 95 | | 137,000 | | 1.169 |
| Sept. 5 | .89 | | | | | 97,700 | | | 2,690 | 154,000 | | | | | | 9,170 | | 96 | | 163,000 | | 1.199 |
| Sept. 13 | .47 | | | | | 99,400 | | | 2,570 | 157,000 | | | | | | 8,980 | | 96 | | 144,000 | | 1.203 |
| Sept. 29 | .97 | | | | | 97,700 | | | 2,820 | 153,000 | | | | | | 8,930 | | 96 | | 143,000 | | 1.198 |

Note: Values given in this table are expressed in parts per million and should be multiplied by the density in any computation of loads.

## 814.5. HAYSTACK CREEK NEAR ASPERMONT, TEX.

LOCATION.--About 400 feet upstream from mouth, about 20 miles northwest of Aspermont, Stonewall County.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1960.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | | |
| Oct. 5, 1959 | 0.25 | | | | | 17,800 | | | 3,710 | 28,000 | | | | | | 5,160 | | 88 | | 63,400 | | 1.037 |
| Oct. 22 | .18 | | | | | 37,500 | | | 4,390 | 58,200 | | | | | | 6,520 | | 93 | | 104,000 | | 1.074 |
| Oct. 27 | .16 | | | | | 34,500 | | | 4,150 | 54,300 | | | | | | 6,080 | | 93 | | 98,300 | | 1.069 |
| Nov. 3 | 1.94 | | | | | 14,400 | | | 2,550 | 22,400 | | | | | | 3,630 | | 90 | | 53,800 | | 1.029 |
| Nov. 20 | .24 | | | | | 28,800 | | | 4,100 | 45,400 | | | | | | 5,680 | | 92 | | 87,900 | | 1.057 |
| Dec. 2 | .14 | | | | | 32,500 | | | 4,110 | 50,300 | | | | | | 5,790 | | 92 | | 94,900 | | 1.063 |
| Dec. 18 | .53 | | | | | 15,900 | | | 3,250 | 24,800 | | | | | | 4,300 | | 89 | | 57,500 | | 1.032 |
| Jan. 19, 1960 | .18 | | | | | 28,600 | | | 4,010 | 44,500 | | | | | | 5,610 | | 92 | | 87,500 | | 1.056 |
| Feb. 17 | .57 | | | | | 33,700 | | | 3,690 | 52,600 | | | | | | 5,260 | | 93 | | 96,500 | | 1.065 |
| Mar. 16 | .19 | | | | | 32,200 | | | 4,090 | 50,400 | | | | | | 5,930 | | 92 | | 94,100 | | 1.062 |
| Mar. 31 | .09 | | | | | 58,200 | | | 4,010 | 91,600 | | | | | | 7,540 | | 94 | | 134,000 | | 1.114 |
| Apr. 14 | .74 | | | | | 36,700 | | | 4,400 | 56,900 | | | | | | 6,250 | | 93 | | 87,000 | | 1.072 |
| Apr. 20 | .20 | | | | | 38,800 | | | 4,540 | 60,300 | | | | | | 6,590 | | 93 | | 115,000 | | 1.078 |
| Apr. 28 | .18 | | | | | 42,600 | | | 4,740 | 66,700 | | | | | | 7,080 | | 93 | | 122,000 | | 1.087 |
| May 16 | .07 | | | | | 52,800 | | | 5,080 | 82,400 | | | | | | 8,030 | | 93 | | 119,000 | | 1.108 |
| May 23 | .08 | | | | | 47,700 | | | 5,360 | 75,100 | | | | | | 7,920 | | 93 | | 114,000 | | 1.099 |
| June 3 | .07 | | | | | 47,100 | | | 5,250 | 74,000 | | | | | | 7,740 | | 93 | | 113,000 | | 1.098 |
| June 10 | .06 | | | | | 36,000 | | | 4,700 | 56,400 | | | | | | 6,900 | | 92 | | 96,400 | | 1.073 |
| June 23 | .14 | | | | | 53,700 | | | 5,160 | 83,600 | | | | | | 7,770 | | 94 | | 131,000 | | 1.107 |
| July 1 | .12 | | | | | 47,400 | | | 4,990 | 74,200 | | | | | | 7,400 | | 93 | | 122,000 | | 1.093 |
| July 9 | .02 | | | | | 33,700 | | | 4,640 | 53,300 | | | | | | 7,450 | | 91 | | 100,000 | | 1.069 |
| July 12 | .05 | | | | | 48,400 | | | 5,120 | 76,300 | | | | | | 7,930 | | 93 | | 124,000 | | 1.097 |
| July 29 | .13 | | | | | 47,800 | | | 5,060 | 75,500 | | | | | | 7,510 | | 93 | | 113,000 | | 1.092 |
| Aug. 4 | .08 | | | | | 50,100 | | | 5,090 | 79,300 | | | | | | 7,610 | | 93 | | 116,000 | | 1.104 |
| Aug. 15 | .17 | | | | | 43,300 | | | 4,620 | 67,800 | | | | | | 6,810 | | 93 | | 11,400 | | 1.087 |
| Aug. 23 | .08 | | | | | 47,900 | | | 4,860 | 75,300 | | | | | | 7,210 | | 94 | | 120,000 | | 1.095 |
| Sept. 5 | .15 | | | | | 44,000 | | | 4,700 | 68,900 | | | | | | 6,890 | | 93 | | 115,000 | | 1.088 |
| Sept. 13 | .09 | | | | | 45,100 | | | 4,910 | 70,200 | | | | | | 7,160 | | 93 | | 107,000 | | 1.090 |
| Sept. 29 | .17 | | | | | 41,700 | | | 4,530 | 65,500 | | | | | | 6,640 | | 93 | | 104,000 | | 1.084 |

Note: Values given in this table are expressed in parts per million and should be multiplied by the density in any computation of loads.

## 815. SALT CROTON CREEK NEAR ASPERMONT, TEX.

LOCATION.--At gaging station just below the mouth of Haystack Creek and about 20 miles northwest of Aspermont, Stonewall County.
DRAINAGE AREA.--69 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1, 1959 | 21.4 | | | | | 73,900 | | | 3,530 | 116,000 | | | | | | 8,370 | | 95 | | 149,000 | | 1.147 |
| Oct. 2 | 670 | | | | | 1,970 | | | 800 | 3,220 | | | | | | 1,060 | | 80 | | 10,600 | | 1.003 |
| Oct. 5 | 2.50 | | | | | 22,500 | | | 2,610 | 35,400 | | | | | | 4,310 | | 92 | | 73,900 | | 1.044 |
| Oct. 22 | 1.01 | | | | | 84,500 | | | 3,530 | 133,000 | | | | | | 9,070 | | 95 | | 152,000 | | 1.169 |
| Oct. 27 | .56 | | | | | 84,800 | | | 3,580 | 132,000 | | | | | | 8,880 | | 95 | | 153,000 | | 1.171 |
| Nov. 3 | 14.6 | | | | | 17,000 | | | 1,870 | 26,900 | | | | | | 3,040 | | 92 | | 60,000 | | 1.033 |
| Nov. 20 | .81 | | | | | 81,100 | | | 3,420 | 127,000 | | | | | | 8,590 | | 95 | | 152,000 | | 1.164 |
| Dec. 2 | .86 | | | | | 79,400 | | | 3,450 | 124,000 | | | | | | 8,350 | | 95 | | 153,000 | | 1.161 |
| Dec. 18 | 2.83 | | | | | 25,300 | | | 2,450 | 39,600 | | | | | | 4,120 | | 93 | | 80,500 | | 1.048 |
| Jan. 5, 1960 | 19.0 | | | | | 18,900 | | | 1,800 | 29,800 | | | | | | 3,210 | | 93 | | 65,000 | | 1.035 |
| Jan. 19 | .96 | | | | | 64,100 | | | 3,740 | 99,600 | | | | | | 7,620 | | 95 | | 141,000 | | 1.129 |
| Feb. 17 | 2.80 | | | | | 68,600 | | | 3,270 | 108,000 | | | | | | 7,640 | | 95 | | 144,000 | | 1.138 |
| Mar. 2 | 1.49 | | | | | 66,600 | | | 3,510 | 104,000 | | | | | | 7,610 | | 95 | | 143,000 | | 1.130 |
| Mar. 16 | .90 | | | | | 70,200 | | | 3,750 | 112,000 | | | | | | 7,980 | | 95 | | 146,000 | | 1.140 |
| Mar. 31 | .26 | | | | | 85,000 | | | 3,490 | 133,000 | | | | | | 8,640 | | 96 | | 156,000 | | 1.169 |
| Apr. 14 | 1.01 | | | | | 93,500 | | | 3,130 | 146,000 | | | | | | 8,840 | | 96 | | 125,000 | | 1.188 |
| Apr. 20 | .82 | | | | | 91,800 | | | 3,240 | 144,000 | | | | | | 9,440 | | 95 | | 177,000 | | 1.187 |
| Apr. 28 | 1.07 | | | | | 63,700 | | | 4,150 | 99,600 | | | | | | 7,350 | | 95 | | 153,000 | | 1.129 |
| May 16 | .59 | | | | | 70,100 | | | 4,180 | 112,000 | | | | | | 8,840 | | 95 | | 134,000 | | 1.143 |
| May 25 | .62 | | | | | 94,300 | | | 2,850 | 152,000 | | | | | | 10,300 | | 95 | | 146,000 | | 1.198 |
| June 3 | .87 | | | | | 59,100 | | | 4,380 | 93,700 | | | | | | 7,940 | | 94 | | 128,000 | | 1.121 |
| June 10 | .92 | | | | | 40,900 | | | 3,660 | 63,900 | | | | | | 6,330 | | 93 | | 103,000 | | 1.080 |
| June 23 | .73 | | | | | 95,100 | | | 3,030 | 152,000 | | | | | | 10,700 | | 95 | | 146,000 | | 1.196 |
| July 1 | .78 | | | | | 92,900 | | | 3,160 | 147,000 | | | | | | 10,700 | | 95 | | 146,000 | | 1.190 |
| July 5 | 13.6 | | | | | 22,100 | | | 2,420 | 34,500 | | | | | | 3,760 | | 93 | | 69,800 | | 1.043 |
| July 7 | 550 | | | | | 37,200 | | | 1,610 | 58,800 | | | | | | 3,730 | | 96 | | 97,200 | | 1.072 |
| July 9 | .74 | | | | | 24,400 | | | 2,930 | 38,400 | | | | | | 5,010 | | 91 | | 75,100 | | 1.048 |
| July 12 | .67 | | | | | 52,400 | | | 3,940 | 84,300 | | | | | | 8,560 | | 93 | | 121,000 | | 1.110 |
| July 20 | 8.00 | | | | | 88,000 | | | 2,940 | 138,000 | | | | | | 8,510 | | 96 | | 160,000 | | 1.175 |
| July 29 | .66 | | | | | 94,200 | | | 3,150 | 149,000 | | | | | | 9,650 | | 96 | | 145,000 | | 1.192 |
| Aug. 4 | .36 | | | | | 98,500 | | | 2,920 | 156,000 | | | | | | 10,100 | | 95 | | 152,000 | | 1.202 |
| Aug. 15 | .86 | | | | | 98,400 | | | 2,990 | 155,000 | | | | | | 9,000 | | 96 | | 163,000 | | 1.200 |
| Aug. 23 | .90 | | | | | 75,200 | | | 4,050 | 117,000 | | | | | | 8,430 | | 95 | | 152,000 | | 1.150 |
| Aug. 24 | 450 | | | | | 64,700 | | | 3,270 | 102,000 | | | | | | 7,360 | | 95 | | 144,000 | | 1.128 |
| Aug. 24 | 8.00 | | | | | 96,700 | | | 2,800 | 152,000 | | | | | | 10,200 | | 95 | | 163,000 | | 1.195 |
| Sept. 5 | .69 | | | | | 93,500 | | | 2,980 | 147,000 | | | | | | 9,170 | | 96 | | 161,000 | | 1.189 |
| Sept. 13 | .57 | | | | | 92,000 | | | 3,030 | 145,000 | | | | | | 8,760 | | 96 | | 141,000 | | 1.187 |
| Sept. 20 | 8.00 | | | | | 86,700 | | | 2,970 | 135,000 | | | | | | 8,190 | | 96 | | 159,000 | | 1.172 |
| Sept. 29 | .93 | | | | | 96,600 | | | 2,880 | 152,000 | | | | | | 9,030 | | 96 | | 142,000 | | 1.196 |

Note: Values given in this table are expressed in parts per million and should be multiplied by the density in any computation of loads.

## SALT CROTON CREEK AT FALLS NEAR ASPERMONT, TEX.

LOCATION.--At falls about 1.5 miles upstream from mouth and 17 miles northwest of Aspermont, Stonewall County.
RECORDS AVAILABLE.--Chemical analyses: January 1958 to September 1960.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| October 22, 1959 | 0.81 | | | | | 48,200 | | | 3,970 | 76,400 | | | | | | 8,490 | | 93 | | 120,000 | | 1.096 |
| Nov. 20 | 1.24 | | | | | 63,900 | | | 3,660 | 101,000 | | | | | | 8,160 | | 94 | | 139,000 | | 1.127 |
| Jan. 19, 1960 | 1.30 | | | | | 50,600 | | | 3,550 | 79,500 | | | | | | 6,860 | | 94 | | 125,000 | | 1.100 |
| Feb. 17 | 1.30 | | | | | 56,100 | | | 3,740 | 87,600 | | | | | | 7,460 | | 94 | | 132,000 | | 1.113 |
| Apr. 20 | .22 | | | | | 83,000 | | | 3,310 | 131,000 | | | | | | 9,010 | | 95 | | 121,000 | | 1.166 |
| Apr. 28 | 1.40 | | | | | 82,400 | | | 3,330 | 130,000 | | | | | | 8,140 | | 96 | | 171,000 | | 1.167 |
| May 16 | .25 | | | | | 84,500 | | | 3,580 | 135,000 | | | | | | 9,370 | | 95 | | 142,000 | | 1.174 |
| May 25 | .02 | | | | | 51,100 | | | 2,970 | 80,500 | | | | | | 6,710 | | 94 | | 116,000 | | 1.103 |
| June 3 | .73 | | | | | 41,300 | | | 3,920 | 64,800 | | | | | | 6,960 | | 93 | | 104,000 | | 1.081 |
| June 10 | 1.34 | | | | | 17,000 | | | 3,060 | 26,600 | | | | | | 3,680 | | 91 | | 57,800 | | 1.032 |
| June 23 | .23 | | | | | 16,900 | | | 3,060 | 26,400 | | | | | | 4,220 | | 90 | | 51,200 | | 1.034 |
| July 1 | .03 | | | | | 15,400 | | | 3,600 | 24,200 | | | | | | 4,170 | | 89 | | 57,200 | | 1.031 |
| July 12 | 1.29 | | | | | 12,900 | | | 2,420 | 20,700 | | | | | | 3,650 | | 88 | | 50,300 | | 1.026 |
| July 29 | .30 | | | | | 8,120 | | | 2,200 | 12,700 | | | | | | 2,830 | | 86 | | 33,000 | | 1.016 |
| Aug. 4 | .21 | | | | | 5,500 | | | 2,140 | 8,700 | | | | | | 2,610 | | 82 | | 24,400 | | 1.011 |
| Aug. 15 | a .02 | | | | | 44,000 | | | 4,960 | 68,900 | | | | | | 8,270 | | 92 | | 117,000 | | 1.088 |
| Sept. 5 | .12 | | | | | 3,780 | | | 2,010 | 5,950 | | | | | | 2,420 | | 77 | | 18,900 | | 1.009 |
| Sept. 13 | .16 | | | | | 28,600 | | | 3,110 | 46,700 | | | | | | 5,740 | | 92 | | 85,600 | | 1.060 |
| Sept. 29 | .36 | | | | | 51,700 | | | 2,880 | 81,700 | | | | | | 6,620 | | 94 | | 116,000 | | 1.102 |

a Field estimate.
Note: Values given in this table are expressed in parts per million and should be multiplied by the density in any computation of loads.

## 820. SALT FORK BRAZOS RIVER NEAR ASPERMONT, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 83, 5½ miles downstream from Salt Croton Creek and 13.2 miles northwest of Aspermont, Stonewall County.
DRAINAGE AREA.--4,830 square miles, approximately, of which 2,770 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1948 to September 1951, October 1956 to September 1960.
Water temperatures: October 1948 to September 1951, October 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 83,900 ppm Apr. 28-30; minimum, 1,240 ppm July 7-9.
Hardness: Maximum, 5,510 ppm Apr. 28-30; minimum, 334 ppm July 7-9.
Specific conductance: Maximum daily, 125,000 micromhos Apr. 28; minimum daily, 1,690 micromhos July 8.
Water temperatures: Maximum, 91°F Aug. 3; minimum, freezing point on several days during winter months.
EXTREMES, 1948-51, 1956-60.--Dissolved solids: Maximum, 99,200 ppm Mar. 30-31, 1959; minimum, 1,240 ppm July 7-9, 1960.
Hardness: Maximum, 6,200 ppm Mar. 30-31, 1959; minimum, 334 ppm July 7-9, 1960.
Specific conductance: Maximum daily, 125,000 micromhos Apr. 28, 1960; minimum daily, 1,690 micromhos July 8, 1960.
Water temperatures: Maximum, 95°F July 5, 1959; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | | |
| Oct. 1, 1959 | 31.0 | -- | | -- | -- | -- | -- | 67 | -- | 52,800 | | -- | -- | -- | -- | 4,780 | 4,720 | -- | -- | 99,100 | 7.4 | 1.066 |
| Oct. 2, 9-17 | 67.9 | 14 | | 570 | 115 | 3,760 | 20 | 146 | 1,460 | 5,950 | | -- | 12,000 | 16.5 | 2,200 | 1,900 | 1,780 | 81 | 37 | 18,300 | 7.7 | 1.009 |
| Oct. 3-8 | 602 | 12 | | 268 | 33 | 1,110 | | 98 | 713 | 1,700 | | 3.0 | 3,890 | 5.29 | 6,320 | 804 | 724 | 75 | 17 | 6,340 | 7.4 | -- |
| Oct. 18-30 | 4.22 | 13 | | 933 | 201 | 8,660 | | 141 | 2,320 | 13,800 | | -- | 26,000 | 36.0 | 296 | 3,150 | 3,040 | 86 | 67 | 35,700 | 7.6 | 1.018 |
| Oct. 31, Nov. 1-4 | 14.1 | 11 | | 1,090 | 305 | 19,000 | | 126 | 2,370 | 30,300 | | -- | 53,100 | 75.0 | 2,020 | 3,970 | 3,870 | 91 | 131 | 65,700 | 7.4 | 1.038 |
| Nov. 5-13 | 7.76 | 11 | | 883 | 189 | 9,230 | | 148 | 2,240 | 14,600 | | -- | 27,200 | 37.7 | 570 | 2,980 | 2,860 | 87 | 73 | 37,800 | 7.6 | 1.019 |
| Nov. 14-30 | 2.14 | 11 | | 1,180 | 268 | 16,400 | | 170 | 2,820 | 25,900 | | -- | 46,700 | 65.6 | 270 | 4,050 | 3,910 | 90 | 112 | 58,700 | 7.5 | 1.033 |
| Dec. 1-12 | 1.35 | 11 | | 1,240 | 345 | 19,400 | | 162 | 2,910 | 30,900 | | -- | 54,900 | 77.4 | 200 | 4,510 | 4,380 | 90 | 126 | 63,500 | 7.4 | 1.036 |
| Dec. 13-14 | 1.80 | 11 | | 1,260 | 349 | 22,400 | | 151 | 2,910 | 35,600 | | -- | 62,600 | 88.5 | 304 | 4,580 | 4,460 | 91 | 144 | 70,000 | 7.5 | 1.040 |
| Dec. 15, 20-26 | 118 | 11 | | 402 | 79 | 3,630 | | 135 | 1,010 | 5,710 | | -- | 10,900 | 14.9 | 3,470 | 1,330 | 1,220 | 86 | 43 | 17,000 | 8.1 | 1.007 |
| Dec. 27-31 | 37.0 | 13 | | 690 | 169 | 7,320 | | 183 | 1,760 | 11,600 | | -- | 21,600 | 29.8 | 2,160 | 2,420 | 2,270 | 87 | 65 | 30,700 | 7.7 | 1.015 |
| Jan. 1-15, 1960 | 36.3 | 12 | | 762 | 213 | 9,260 | | 162 | 1,960 | 14,700 | | -- | 27,000 | 37.3 | 2,650 | 2,780 | 2,640 | 88 | 76 | 38,800 | 7.7 | 1.017 |
| Jan. 16-31 | 20.1 | 12 | | 826 | 229 | 9,200 | | 191 | 2,170 | 14,600 | | -- | 27,100 | 37.5 | 1,470 | 3,000 | 2,850 | 87 | 73 | 38,300 | 7.6 | 1.017 |
| Feb. 1-17 | 16.6 | 13 | | 883 | 270 | 10,000 | | 159 | 2,330 | 16,000 | | -- | 29,600 | 41.0 | 1,330 | 3,310 | 3,180 | 87 | 76 | 39,600 | 7.6 | 1.019 |
| Feb. 18-29 | 12.9 | 14 | | 1,010 | 302 | 13,700 | | 193 | 2,600 | 21,700 | | -- | 39,400 | 55.0 | 1,370 | 3,760 | 3,600 | 89 | 97 | 50,200 | 7.6 | 1.027 |
| Mar. 1-14 | 11.0 | 14 | | 984 | 309 | 13,300 | | 151 | 2,520 | 21,200 | | -- | 38,400 | 53.6 | 1,140 | 3,730 | 3,600 | 89 | 95 | 48,000 | 7.7 | 1.026 |
| Mar. 15-31 | 3.64 | 9.5 | | 1,130 | 333 | 16,400 | | 152 | 2,850 | 26,100 | | -- | 46,900 | 65.9 | 461 | 4,190 | 4,060 | 89 | 110 | 56,200 | 7.7 | 1.033 |
| Apr. 1-16 | .68 | 11 | | 1,310 | 368 | 17,600 | 63 | 155 | 3,290 | 27,800 | | -- | 50,500 | 71.2 | 92.7 | 4,780 | 4,650 | 89 | 111 | 62,600 | 7.5 | 1.036 |
| Apr. 17-27 | .58 | 9.7 | | 1,390 | 346 | 15,800 | | 146 | 3,370 | 25,200 | | -- | 46,200 | 64.8 | 72.3 | 4,890 | 4,770 | 88 | 98 | 58,200 | 7.3 | 1.032 |
| Apr. 28-30 | 2.27 | 13 | | 1,420 | 478 | 30,400 | | 158 | 3,240 | 48,300 | | -- | 83,900 | 121 | 514 | 5,510 | 5,380 | 92 | 178 | 92,400 | 7.3 | 1.060 |
| May 1-29 | 1.90 | 17 | | 1,450 | 339 | 18,100 | | 122 | 3,580 | 28,700 | | -- | 52,200 | 73.5 | 268 | 5,010 | 4,910 | 89 | 111 | 65,300 | 7.2 | 1.036 |
| May 30 | 155 | -- | | -- | -- | -- | | 107 | -- | 10,900 | | -- | -- | -- | -- | 1,400 | 1,310 | -- | -- | 28,700 | 7.7 | 1.011 |
| May 31, June 1, 5-8 | 107 | 17 | | 422 | 91 | 4,190 | | 147 | 1,020 | 6,630 | | -- | 12,500 | 17.1 | 3,610 | 1,430 | 1,310 | 86 | 48 | 19,400 | 7.6 | 1.007 |
| June 2-4 | 56.7 | 18 | | 248 | 46 | 2,090 | | 127 | 678 | 3,220 | | -- | 6,360 | 8.65 | 974 | 808 | 704 | 85 | 32 | 10,400 | 8.0 | -- |
| June 9-13 | 147 | 17 | | 168 | 33 | 941 | | 151 | 509 | 1,380 | | 2.0 | 3,120 | 4.24 | 1,240 | 554 | 431 | 79 | 17 | 5,160 | 7.8 | -- |
| June 14-19 | 25.6 | 19 | | 334 | 81 | 2,540 | | 150 | 840 | 4,040 | | -- | 7,930 | 10.8 | 548 | 1,170 | 1,040 | 83 | 32 | 12,600 | 7.8 | 1.003 |
| June 20 | .80 | -- | | -- | -- | -- | | 76 | -- | 9,980 | | -- | -- | -- | -- | 2,380 | 2,320 | -- | -- | 26,200 | 7.3 | 1.012 |
| June 21-30, July 1-4 | .36 | 23 | | 1,430 | 348 | 16,300 | | 114 | 3,470 | 26,100 | | -- | 47,700 | 67.1 | 46.4 | 5,000 | 4,910 | 88 | 100 | 58,000 | 6.1 | 1.034 |
| July 5 (12 p.m.-12 m.) | 200 | -- | | -- | -- | -- | | 105 | -- | 12,000 | | -- | -- | -- | -- | 1,950 | 1,860 | -- | -- | 30,900 | 7.4 | 1.012 |
| July 5 (12 m.-12 p.m.), 6 | 1,308 | 17 | | 140 | 30 | 711 | | 148 | 412 | 1,040 | | 2.5 | 2,430 | 3.30 | 8,580 | 473 | 352 | 77 | 14 | 4,030 | 7.7 | -- |
| July 7-9 | 4,280 | 22 | | 106 | 17 | 310 | | 125 | 299 | 420 | | 3.8 | 1,240 | 1.69 | 14,330 | 334 | 232 | 67 | 7.4 | 2,140 | 7.8 | -- |
| July 10-17 | 278 | 19 | | 140 | 28 | 661 | | 130 | 368 | 1,000 | | 2.0 | 2,280 | 3.10 | 1,710 | 464 | 358 | 76 | 13 | 3,850 | 7.6 | -- |
| July 18-21, 23-24 | 97.5 | 20 | | 310 | 56 | 1,430 | | 127 | 798 | 2,260 | | -- | 4,940 | 6.72 | 1,300 | 1,000 | 900 | 76 | 20 | 7,900 | 7.6 | -- |
| July 22 | 135 | -- | | -- | -- | -- | | 95 | -- | 9,580 | | -- | -- | -- | -- | 2,640 | 2,560 | -- | -- | 26,000 | 7.5 | 1.012 |
| July 25-31 | 10.1 | 17 | | 586 | 129 | 3,700 | | 113 | 1,550 | 5,910 | | -- | 12,000 | 16.4 | 327 | 1,990 | 1,900 | 80 | 36 | 17,700 | 7.4 | 1.007 |
| Aug. 1-6 | 1.28 | 12 | | 897 | 199 | 6,950 | | 101 | 2,330 | 11,100 | | -- | 21,500 | 29.6 | 74.3 | 3,060 | 2,970 | 83 | 55 | 30,300 | 7.2 | 1.014 |
| Aug. 7-9 | .47 | 16 | | 1,210 | 254 | 11,400 | | 127 | 2,990 | 18,100 | | -- | 34,000 | 47.3 | 43.1 | 4,060 | 3,960 | 86 | 78 | 44,200 | 7.6 | 1.024 |
| Aug. 10-20, 28-31 | .63 | 49 | | 1,450 | 320 | 15,400 | | 119 | 3,410 | 24,700 | | -- | 45,400 | 63.7 | 77.2 | 4,930 | 4,830 | 87 | 95 | 56,500 | 7.0 | 1.032 |
| Aug. 21-27 | 14.9 | 22 | | 1,520 | 384 | 22,200 | | 134 | 3,410 | 35,400 | | -- | 63,000 | 89.5 | 2,530 | 5,370 | 5,260 | 90 | 132 | 72,900 | 7.1 | 1.045 |
| Sept. 1-15 | .23 | 17 | | 1,540 | 360 | 17,800 | | 128 | 3,750 | 28,400 | | -- | 51,900 | 73.2 | 32.2 | 5,320 | 5,220 | 88 | 106 | 60,300 | 7.0 | 1.037 |
| Sept. 16-30 | .25 | 17 | | 1,540 | 351 | 18,000 | | 132 | 3,730 | 28,700 | | -- | 52,400 | 74.0 | 35.4 | 5,290 | 5,180 | 88 | 108 | 60,600 | 7.5 | 1.038 |
| aWeighted average | 80.2 | 18 | | 246 | 49 | 1,810 | | 126 | 653 | 2,820 | | -- | 5,660 | 7.70 | 1,230 | 816 | 712 | 83 | 28 | 8,340 | -- | -- |

a Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1959 to September 1960.
Note: Values given in this table are expressed in parts per million and should be multiplied by the density, where given, in any computation of loads.

## 825. BRAZOS RIVER AT SEYMOUR, TEX.

LOCATION.--At gaging station at bridge on U. S. Highways 277 and 283, three-quarters of a mile upstream from Wichita Valley Railway bridge, 1 mile southwest of courthouse in Seymour, Baylor County, and at mile 832.
DRAINAGE AREA.--14,490 square miles, approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: August 1959 to September 1960.
Water temperatures: August 1959 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 14,000 ppm Mar. 1-16; minimum, 1,260 ppm July 6-15.
Hardness: Maximum, 2,580 ppm May 1-4; minimum, 386 ppm Sept. 27-28.
Specific conductance: Maximum daily, 26,200 micromhos Feb. 9; minimum daily, 1,700 micromhos July 9.
Water temperatures: Maximum, 98°F July 27; minimum, 33°F Mar. 4.
EXTREMES, August 1959 to September 1960.--Dissolved solids: Maximum, 14,000 ppm Mar. 1-16, 1960; minimum, 1,260 ppm July 6-15, 1960.
Hardness: Maximum, 2,580 ppm May 1-4, 1960; minimum, 386 ppm Sept. 27-28, 1960.
Specific conductance: Maximum daily, 26,200 micromhos Feb. 9, 1960; minimum daily, 1,700 micromhos July 9, 1960.
Water temperatures: Maximum, 99°F Aug. 6, 1959; minimum, 33°F Mar. 4, 1960.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-2, 1959 | a0.95 | 24 | | 338 | 66 | 1,410 | 13 | 80 | 1,090 | 2,100 | -- | -- | | 5,080 | 6.91 | 13.0 | 1,120 | 1,050 | 73 | 18 | 7,870 | 7.8 |
| Oct. 3-4, 8-12 | 2,407 | 13 | | 192 | 21 | 537 | | 98 | 500 | 800 | -- | 3.5 | | 2,110 | 2.87 | 13,710 | 566 | 485 | 67 | 9.8 | 3,490 | 7.5 |
| Oct. 5-7 | 2,360 | 18 | | 175 | 22 | 339 | | 108 | 478 | 478 | -- | 5.0 | | 1,570 | 2.14 | 10,000 | 527 | 438 | 58 | 6.4 | 2,500 | 8.1 |
| Oct. 13-20 | 100 | 14 | | 322 | 58 | 1,410 | | 118 | 896 | 2,180 | -- | -- | | 4,940 | 6.72 | 1,330 | 1,040 | 946 | 75 | 19 | 7,800 | 7.7 |
| Oct. 21-29 | 40.2 | 16 | | 463 | 82 | 2,210 | | 111 | 1,400 | 3,360 | -- | -- | | 7,590 | 10.4 | 824 | 1,490 | 1,400 | 76 | 25 | 11,300 | 7.6 |
| Oct. 30-31, Nov. 1, 4-6 | 76.3 | 11 | | 280 | 54 | 1,070 | | 116 | 772 | 1,660 | -- | 2.0 | | 3,910 | 5.32 | 805 | 920 | 826 | 72 | 15 | 6,230 | 7.5 |
| Nov. 2-3, 7-10 | 69.0 | 11 | | 422 | 83 | 1,970 | | 132 | 1,160 | 3,100 | -- | -- | | 6,810 | 9.26 | 1,270 | 1,390 | 1,290 | 75 | 23 | 10,600 | 7.6 |
| Nov. 11-15 | 38.2 | 9.9 | | 545 | 122 | 3,630 | | 163 | 1,390 | 5,800 | -- | -- | | 11,600 | 15.9 | 1,200 | 1,860 | 1,730 | 81 | 37 | 17,600 | 7.7 |
| Nov. 16-30 | 18.1 | 14 | | 547 | 125 | 2,510 | | 183 | 1,630 | 3,900 | -- | -- | | 8,820 | 12.1 | 431 | 1,880 | 1,730 | 74 | 25 | 13,300 | 7.7 |
| Dec. 1-14 | 10.2 | 11 | | 538 | 131 | 2,480 | | 148 | 1,550 | 3,930 | -- | -- | | 8,710 | 11.9 | 240 | 1,880 | 1,760 | 74 | 25 | 13,100 | 7.4 |
| Dec. 15-16, 27-31 | 119 | 10 | | 302 | 57 | 1,670 | | 156 | 772 | 2,620 | -- | -- | | 5,510 | 7.49 | 1,770 | 988 | 860 | 79 | 23 | 8,950 | 7.8 |
| Dec. 17-20, 26 | 874 | 10 | | 232 | 37 | 918 | | 121 | 624 | 1,400 | -- | 4.5 | | 3,290 | 4.47 | 7,760 | 731 | 632 | 73 | 15 | 5,370 | 8.0 |
| Dec. 21-25 | 352 | 10 | | 152 | 26 | 627 | | 128 | 426 | 920 | -- | 3.8 | | 2,230 | 3.03 | 2,120 | 486 | 381 | 74 | 12 | 3,740 | 7.6 |
| Jan. 1-10, 1960 | 104 | 9.8 | | 434 | 96 | 2,610 | | 171 | 1,110 | 4,160 | -- | -- | | 8,500 | 11.6 | 2,390 | 1,480 | 1,340 | 79 | 29 | 13,300 | 7.8 |
| Jan. 11-31 | 72.0 | 11 | | 572 | 135 | 3,750 | | 175 | 1,510 | 5,970 | -- | -- | | 12,000 | 16.4 | 2,330 | 1,980 | 1,840 | 80 | 37 | 17,700 | 7.7 |
| Feb. 1-3, 9-13 | 56.1 | 13 | | 575 | 153 | 4,180 | | 150 | 1,590 | 6,650 | -- | -- | | 13,200 | 18.1 | 2,000 | 2,060 | 1,940 | 82 | 40 | 19,700 | 7.6 |
| Feb. 4-8 | 114 | 13 | | 365 | 83 | 1,970 | | 137 | 1,010 | 3,100 | -- | -- | | 6,610 | 8.99 | 2,030 | 1,250 | 1,140 | 77 | 24 | 10,500 | 7.8 |
| Feb. 14-29 | 32.7 | 14 | | 631 | 166 | 3,870 | | 179 | 1,760 | 6,160 | -- | -- | | 12,700 | 17.4 | 1,120 | 2,260 | 2,110 | 79 | 35 | 18,600 | 7.6 |
| Mar. 1-16 | 27.3 | 22 | | 644 | 189 | 4,310 | | 74 | 1,830 | 6,940 | 0.6 | -- | | 14,000 | 19.2 | 1,030 | 2,380 | 2,320 | 80 | 38 | 20,800 | 6.8 |
| Mar. 17-31 | 20.4 | 12 | | 635 | 185 | 3,760 | | 111 | 1,830 | 6,050 | .7 | -- | | 12,500 | 17.1 | 688 | 2,340 | 2,230 | 78 | 34 | 18,600 | 7.1 |
| Apr. 1-13 | 8.47 | 7.8 | | 606 | 171 | 3,200 | 19 | 101 | 1,950 | 4,970 | -- | -- | | 11,000 | 15.0 | 252 | 2,220 | 2,130 | 76 | 30 | 15,900 | 7.2 |
| Apr. 14-16 | 33.0 | 13 | | 220 | 58 | 1,010 | | 161 | 644 | 1,550 | -- | 1.0 | | 3,580 | 4.87 | 319 | 788 | 656 | 74 | 16 | 5,800 | 7.9 |
| Apr. 17-30 | 4.81 | 6.2 | | 557 | 172 | 3,150 | | 101 | 2,280 | 4,600 | -- | -- | | 10,800 | 14.8 | 140 | 2,100 | 2,010 | 77 | 30 | 15,000 | 7.4 |
| May 1-4 | 6.32 | -- | | -- | -- | -- | | 95 | -- | 5,210 | -- | -- | | -- | -- | -- | 2,580 | 2,500 | -- | -- | 17,200 | 7.3 |
| May 5, 8-10 | 21.6 | 11 | | 238 | 62 | 1,010 | | 106 | 736 | 1,550 | -- | 3.0 | | 3,660 | 4.98 | 213 | 849 | 762 | 72 | 15 | 5,960 | 7.5 |
| May 6-7 | 26.5 | 16 | | 143 | 26 | 417 | | 96 | 410 | 610 | -- | 5.4 | | 1,670 | 2.27 | 119 | 464 | 386 | 66 | 8.4 | 2,750 | 7.7 |
| May 11-28 | a3.08 | 8.4 | | 488 | 149 | 2,520 | | 102 | 1,690 | 3,880 | -- | -- | | 8,790 | 12.0 | 73.1 | 1,830 | 1,750 | 75 | 26 | 13,300 | 7.2 |
| May 29-31 | 254 | 20 | | 320 | 42 | 611 | | 91 | 872 | 930 | -- | 6.0 | | 2,850 | 3.88 | 1,950 | 971 | 896 | 58 | 8.6 | 4,360 | 7.6 |
| June 1-8 | 408 | 18 | | 270 | 42 | 1,000 | | 126 | 706 | 1,550 | -- | 5.0 | | 3,650 | 4.96 | 4,020 | 846 | 742 | 72 | 15 | 6,000 | 6.9 |
| June 9-10 | 448 | 21 | | 177 | 24 | 305 | | 78 | 498 | 438 | -- | 4.8 | | 1,510 | 2.05 | 1,830 | 540 | 476 | 55 | 5.7 | 2,360 | 7.5 |
| June 11-21 | 162 | 20 | | 335 | 48 | 1,080 | | 93 | 948 | 1,640 | -- | 4.0 | | 4,120 | 5.60 | 1,800 | 1,030 | 958 | 69 | 15 | 6,450 | 7.3 |
| June 22-30, July 1-5 | a11.1 | 16 | | 636 | 131 | 2,770 | | 89 | 1,830 | 4,370 | -- | -- | | 9,800 | 13.4 | 294 | 2,130 | 2,050 | 74 | 26 | 14,500 | 7.4 |
| July 6-15 | 4,953 | 18 | | 150 | 19 | 256 | | 103 | 425 | 340 | -- | 3.5 | | 1,260 | 1.71 | 16,850 | 432 | 368 | 55 | 5.2 | 1,990 | 7.4 |
| July 16-24 | 497 | 22 | | 232 | 40 | 689 | | 127 | 616 | 1,060 | -- | 1.0 | | 2,720 | 3.70 | 3,650 | 744 | 640 | 67 | 11 | 4,420 | 7.6 |
| July 25-31 | 144 | 31 | | 495 | 81 | 1,970 | | 76 | 1,370 | 3,100 | -- | -- | | 7,080 | 9.63 | 2,750 | 1,570 | 1,510 | 73 | 22 | 10,800 | 7.3 |
| Aug. 1-16 | 36.1 | 26 | | 568 | 115 | 2,150 | | 72 | 1,640 | 3,410 | -- | -- | | 7,940 | 10.8 | 774 | 1,890 | 1,830 | 71 | 22 | 12,000 | 7.2 |
| Aug. 17-18, 21-23 | 55.2 | 18 | | 420 | 61 | 822 | | 85 | 1,190 | 1,260 | -- | 2.0 | | 3,820 | 5.20 | 569 | 1,300 | 1,230 | 58 | 9.9 | 5,610 | 7.6 |
| Aug. 19-20 | 57.5 | 16 | | 269 | 34 | 424 | | 76 | 749 | 630 | -- | 2.2 | | 2,160 | 2.94 | 335 | 811 | 748 | 53 | 6.5 | 3,270 | 7.5 |
| Aug. 24-31 | 5.92 | 15 | | 525 | 95 | 1,600 | | 85 | 1,540 | 2,480 | -- | -- | | 6,300 | 8.57 | 101 | 1,700 | 1,630 | 67 | 17 | 9,300 | 7.3 |
| Sept. 1-25 | a .86 | 16 | | 746 | 158 | 2,530 | | 111 | 2,180 | 4,000 | -- | -- | | 9,680 | 13.2 | 22.5 | 2,510 | 2,420 | 69 | 22 | 14,000 | 7.2 |
| Sept. 26, 29-30 | 14.6 | 10 | | 278 | 50 | 852 | | 86 | 759 | 1,340 | -- | 1.2 | | 3,330 | 4.53 | 131 | 899 | 828 | 67 | 12 | 5,310 | 7.6 |
| Sept. 27-28 | 72.0 | 12 | | 115 | 24 | 362 | | 82 | 349 | 525 | -- | 3.0 | | 1,430 | 1.94 | 278 | 386 | 318 | 67 | 8.0 | 2,420 | 7.4 |
| Weighted average | 279 | 17 | | 209 | 32 | 649 | | 108 | 576 | 975 | -- | -- | | 2,510 | 3.41 | 1,890 | 653 | 564 | 68 | 11 | 3,960 | -- |

a Includes days of less than 0.05 cubic feet per second discharge.

## 865. HUBBARD CREEK NEAR BRECKENRIDGE, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 183, 2.3 miles downstream from Big Sandy Creek, 6.8 miles northwest of Breckenridge, Stephens County, 7 miles upstream from Gonzales Creek, and 8 miles upstream from Clear Fork Brazos River.
DRAINAGE AREA.--1,087 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1955 to September 1960.
Water temperatures: April 1955 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 5,350 ppm July 1-5; minimum, 142 ppm July 6.
Hardness: Maximum, 1,820 ppm July 1-5; minimum, 99 ppm July 6.
Specific conductance: Maximum daily, 9,270 micromhos July 4; minimum daily, 247 micromhos July 6.
EXTREMES, 1955-60.--Dissolved solids: Maximum, 5,350 ppm July 1-5, 1960; minimum, 118 ppm Feb. 6-8, 1957.
Hardness: Maximum, 1,820 ppm July 1-5, 1960; minimum, 72 ppm Feb. 6-8, 1957.
Specific conductance: Maximum daily, 9,270 micromhos July 4, 1960; minimum daily, 121 micromhos Apr. 27, 1957.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1, 1959 | 1,230 | -- | | -- | -- | -- | | 110 | -- | 272 | -- | -- | | -- | -- | -- | 244 | 154 | -- | -- | 1,160 | 7.8 |
| Oct. 2-4 | 5,493 | 8.8 | | 34 | 4.2 | 14 | 4.7 | 101 | 12 | 29 | 0.2 | 2.0 | | 159 | 0.22 | 2,360 | 102 | 19 | 22 | 0.6 | 281 | 7.4 |
| Oct. 5-13 | 309 | 12 | | 40 | 6.8 | 38 | | 103 | 21 | 72 | .3 | 2.5 | | a260 | .35 | 217 | 128 | 43 | 39 | 1.5 | 436 | 7.3 |
| Oct. 14-17 | 20.2 | 13 | | 46 | 7.0 | 39 | | 99 | 28 | 83 | -- | 2.5 | | 268 | .36 | 14.6 | 144 | 62 | 37 | 1.4 | 492 | 6.9 |
| Oct. 18-25 | 1.00 | 13 | | 78 | 14 | 61 | | 155 | 72 | 128 | -- | 2.0 | | 444 | .60 | 1.20 | 252 | 125 | 34 | 1.7 | 806 | 7.7 |
| Oct. 26-31, Nov. 1-10 | .42 | 12 | | 122 | 24 | 97 | | 209 | 152 | 200 | -- | 2.0 | | a761 | 1.03 | .86 | 403 | 232 | 34 | 2.1 | 1,220 | 7.6 |
| Nov. 11-30 | .26 | 10 | | 147 | 35 | 137 | | 185 | 254 | 275 | -- | 4.8 | | 954 | 1.30 | .67 | 511 | 360 | 37 | 2.6 | 1,660 | 7.6 |
| Dec. 1-16, 27-31 | .18 | 9.8 | | 169 | 42 | 180 | | 161 | 347 | 345 | .2 | 7.3 | | 1,180 | 1.60 | .57 | 594 | 462 | 40 | 3.2 | 1,880 | 7.6 |
| Dec. 17-26 | .90 | 8.8 | | 124 | 27 | 128 | | 184 | 141 | 282 | .2 | 2.2 | | a865 | 1.18 | 2.10 | 420 | 270 | 40 | 2.7 | 1,390 | 7.8 |
| Jan. 1-2, 10-11, 15-17 | 46.7 | 8.0 | | 86 | 17 | 136 | | 132 | 58 | 290 | .3 | 2.2 | | 662 | .90 | 83.5 | 284 | 176 | 51 | 3.5 | 1,230 | 7.5 |
| Jan. 3-6, 9, 12-13 | 155 | 7.8 | | 80 | 17 | 117 | | 128 | 74 | 240 | .3 | 2.2 | | 601 | .82 | 252 | 270 | 164 | 49 | 3.1 | 1,090 | 7.8 |
| Jan. 7-8, 14 | 149 | 9.6 | | 122 | 30 | 267 | | 110 | 37 | 622 | .3 | 2.2 | | 1,140 | 1.55 | 459 | 428 | 338 | 58 | 5.6 | 2,170 | 7.5 |
| Jan. 18-21 | 21.2 | 13 | | 90 | 23 | 177 | | 114 | 42 | 400 | .2 | 2.8 | | 804 | 1.09 | 46.0 | 319 | 226 | 55 | 4.3 | 1,560 | 7.3 |
| Jan. 22-31, Feb. 1-2 | 3.34 | 8.6 | | 155 | 41 | 330 | | 132 | 69 | 772 | .2 | 3.2 | | 1,440 | 1.96 | 13.0 | 555 | 447 | 56 | 6.1 | 2,740 | 7.2 |
| Feb. 3-5 | 123 | 7.4 | | 63 | 10 | 106 | | 88 | 38 | 220 | .3 | 5.9 | | 494 | .67 | 164 | 198 | 126 | 54 | 3.3 | 937 | 7.1 |
| Feb. 6-15 | 10.3 | 6.8 | | 128 | 30 | 277 | | 113 | 55 | 632 | .2 | 4.2 | | 1,190 | 1.62 | 33.1 | 443 | 350 | 58 | 5.7 | 2,270 | 7.2 |
| Feb. 16-29 | 1.04 | 4.2 | | 165 | 36 | 316 | | 153 | 108 | 712 | .2 | 3.7 | | 1,420 | 1.93 | 3.99 | 560 | 434 | 55 | 5.8 | 2,640 | 7.4 |
| Mar. 1-15 | .67 | 4.8 | | 190 | 47 | 369 | | 139 | 119 | 870 | .3 | 4.2 | | 1,670 | 2.27 | 3.02 | 668 | 554 | 55 | 6.2 | 3,040 | 7.8 |
| Mar. 16-26 | 69.2 | 6.0 | | 208 | 52 | 383 | | 137 | 145 | 920 | .2 | 4.8 | | 1,790 | 2.43 | 334 | 733 | 620 | 53 | 6.2 | 3,240 | 7.7 |
| Mar. 27-31, Apr. 1-3 | 19.8 | 6.0 | | 99 | 23 | 178 | 4.8 | 96 | 44 | 440 | .2 | 4.2 | | 846 | 1.15 | 45.2 | 342 | 263 | 53 | 4.2 | 1,630 | 7.5 |
| Apr. 4-21 | .44 | 4.2 | | 156 | 34 | 233 | | 169 | 164 | 512 | .4 | 4.0 | | 1,190 | 1.62 | 1.41 | 529 | 390 | 49 | 4.4 | 2,110 | 7.8 |
| Apr. 22-25 | 1.38 | -- | | -- | -- | -- | | 172 | -- | 520 | -- | -- | | -- | -- | -- | 615 | 474 | -- | -- | 2,340 | 7.7 |
| Apr. 26 (12 p.m.-12 m.) | 2,330 | 14 | | 51 | 8.7 | 52 | | 127 | 22 | 102 | .4 | 4.5 | | 317 | .43 | 1,990 | 163 | 59 | 41 | 1.8 | 586 | 7.7 |
| Apr. 26 (12 m.-12 p.m.) | 2,330 | 9.8 | | 67 | 14 | 109 | | 101 | 25 | 245 | .2 | 8.9 | | 529 | .72 | 3,330 | 224 | 142 | 51 | 3.2 | 1,020 | 7.7 |
| Apr. 27-28 | 470 | 9.6 | | 50 | 8.7 | 62 | | 108 | 27 | 124 | .3 | 3.8 | | 338 | .46 | 429 | 161 | 72 | 46 | 2.1 | 636 | 7.5 |
| Apr. 29-30, May 1-10 | 44.6 | 9.0 | | 74 | 16 | 109 | | 124 | 34 | 245 | .3 | 3.8 | | 552 | .75 | 66.5 | 250 | 149 | 49 | 3.0 | 1,060 | 7.5 |
| May 11-20 | 3.03 | 7.8 | | 134 | 29 | 179 | | 167 | 144 | 390 | .3 | 5.0 | | 971 | 1.32 | 7.94 | 454 | 316 | 46 | 3.7 | 1,750 | 7.5 |
| May 21-31 | .95 | 6.0 | | 88 | 19 | 106 | | 166 | 87 | 212 | .3 | 2.8 | | 603 | .82 | 1.55 | 298 | 162 | 44 | 2.7 | 1,100 | 7.6 |
| June 1-9 | 1.77 | 9.0 | | 104 | 25 | 126 | | 169 | 124 | 260 | .3 | 2.0 | | 733 | 1.00 | 3.50 | 362 | 224 | 43 | 2.9 | 1,310 | 7.3 |
| June 10 | 2.80 | 7.0 | | 180 | 36 | 399 | | 106 | 35 | 950 | .4 | 1.5 | | 1,660 | 2.26 | 12.5 | 597 | 510 | 59 | 7.1 | 3,120 | 7.6 |
| June 11-30 | .07 | 8.2 | | 502 | 114 | 1,260 | | 88 | 118 | 3,020 | -- | -- | | 5,070 | 6.90 | .96 | 1,720 | 1,650 | 61 | 13 | 8,850 | 6.6 |
| July 1-5 | 0 | -- | | -- | -- | -- | | 109 | -- | 3,180 | -- | -- | | 5,350 | 7.28 | -- | 1,820 | 1,730 | -- | -- | 9,220 | 7.4 |
| July 6 (12 p.m.-12 m.) | 1,340 | 8.8 | | 34 | 3.5 | 12 | | 101 | 11 | 20 | .4 | 2.0 | | 142 | .19 | 514 | 99 | 16 | 21 | .5 | 247 | 8.0 |
| July 6 (12 m.-12 p.m.), 7 (12 p.m.-12 m.) | 1,300 | 12 | | 58 | 9.1 | 64 | | 130 | 15 | 139 | .3 | 3.0 | | 364 | .50 | 1,280 | 182 | 76 | 43 | 2.1 | 678 | 8.0 |
| July 7 (12 m.-12 p.m.), 8-13 | 43.5 | 11 | | 62 | 11 | 84 | | 112 | 22 | 188 | .3 | 2.2 | | 436 | .59 | 51.2 | 200 | 108 | 48 | 2.6 | 821 | 7.3 |
| July 14-15, 21-31 | 5.82 | 13 | | 68 | 13 | 70 | | 148 | 62 | 133 | .3 | 1.8 | | 434 | .59 | 6.82 | 223 | 102 | 41 | 2.0 | 766 | 7.3 |
| July 16-20 | 2.68 | 15 | | 43 | 6.5 | 36 | | 120 | 22 | 62 | .3 | 4.0 | | 248 | .34 | 1.79 | 134 | 36 | 37 | 1.4 | 429 | 7.7 |
| Aug. 1-15 | 0 | 11 | | 84 | 16 | 88 | | 178 | 88 | 162 | .3 | .8 | | a557 | .76 | -- | 276 | 130 | 41 | 2.3 | 932 | 7.3 |
| Aug. 16-19, 21-26 | 4.54 | 8.0 | | 78 | 15 | 121 | | 131 | 58 | 248 | .4 | 1.8 | | 594 | .81 | 7.28 | 256 | 148 | 51 | 3.3 | 1,090 | 6.9 |
| Aug. 20 | 59.0 | 9.0 | | 112 | 23 | 290 | | 121 | 28 | 620 | .4 | 2.5 | | 1,140 | 1.55 | 182 | 374 | 275 | 63 | 6.5 | 2,160 | 7.6 |
| Aug. 27-31, Sept. 1-15 | .16 | 9.4 | | 80 | 15 | 90 | | 126 | 108 | 170 | .3 | 1.2 | | a586 | .80 | .25 | 261 | 158 | 43 | 2.4 | 962 | 7.3 |
| Sept. 16-30 | 2.59 | 7.4 | | 82 | 16 | 98 | | 131 | 95 | 195 | .3 | 1.5 | | 559 | .76 | 3.91 | 270 | 163 | 44 | 2.6 | 1,020 | 7.2 |
| Weighted average | 83.0 | 9.4 | | 51 | 8.7 | 58 | | 107 | 25 | 120 | 0.2 | 2.7 | | 330 | 0.45 | 74.0 | 163 | 76 | 44 | 2.0 | 601 | -- |

a Residue on evaporation at 180°C.

## 882. SALT CREEK NEAR NEWCASTLE, TEX.

LOCATION.--At gaging station at county bridge, 1.0 mile upstream from Oak Creek, 2.0 miles upstream from State Highway 24 bridge, 5.0 miles east of Newcastle, Young County, and about 8.5 miles upstream from Salt Creek Reservoir Dam.
DRAINAGE AREA.--57.9 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1958 to March 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,700 ppm Oct. 19-29; minimum, 82 ppm Oct. 3-4.
Hardness: Maximum, 570 ppm Oct. 19-29; minimum, 34 ppm Oct. 3-4.
Specific conductance: Maximum daily, 3,630 micromhos Oct. 30; minimum daily, 96 micromhos Oct. 3.
EXTREMES, 1958-60.--Dissolved solids: Maximum, 4,350 ppm June 21-30, July 1-5, 1958; minimum, 51 ppm July 18-19, 1959.
Hardness: Maximum, 1,230 ppm June 21-30, July 1-5, 1958; minimum, 22 ppm July 18-19, 1959.
Specific conductance: Maximum daily, 11,000 micromhos June 24, 1958; minimum daily, 72 micromhos July 19, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, October 1959 to March 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-2, 7-9, 1959---- | a2.38 | 13 | | 52 | 11 | 88 | 6.9 | 111 | 12 | 190 | 0.5 | 1.5 | | 430 | 0.58 | 27.6 | 174 | 84 | 51 | 2.9 | 838 | 7.9 |
| Oct. 3-4---------- | 1,670 | 18 | | 9.3 | 2.6 | 12 | | 47 | 4.2 | 10 | .4 | 3.0 | | 82 | .11 | 370 | 34 | 0 | 44 | .9 | 120 | 7.3 |
| Oct. 5-6---------- | 106 | 14 | | 26 | 5.0 | 39 | | 82 | 6.2 | 67 | .4 | 1.5 | | 199 | .27 | 57.0 | 86 | 19 | 50 | 1.8 | 367 | 7.8 |
| Oct. 10-18---------- | .34 | 17 | | 110 | 22 | 248 | | 132 | 22 | 545 | .4 | 4.0 | | 1,030 | 1.40 | .95 | 365 | 257 | 60 | 5.7 | 1,960 | 7.9 |
| Oct. 19-29---------- | a .10 | 12 | | 166 | 38 | 424 | | 140 | 32 | 950 | .4 | 4.0 | | 1,700 | 2.31 | .46 | 570 | 456 | 62 | 7.7 | 3,230 | 8.0 |
| Oct. 30-31, Nov. 1, 4,-7-10---------- | 13.2 | 12 | | 30 | 6.7 | 53 | | 71 | 11 | 104 | .3 | .2 | | 252 | .34 | 8.98 | 102 | 44 | 53 | 2.3 | 504 | 7.7 |
| Nov. 2-3, 11-15-------- | a .33 | 12 | | 50 | 11 | 103 | | 87 | 15 | 214 | .3 | 4.5 | | 453 | .62 | .40 | 170 | 98 | 57 | 3.4 | 863 | 7.7 |
| Nov. 5-6---------- | 8.05 | 18 | | 15 | 4.2 | 25 | | 56 | 7.4 | 38 | .4 | 1.8 | | 138 | .19 | 3.00 | 55 | 9 | 50 | 1.5 | 230 | 7.6 |
| Nov. 16-30---------- | 0 | 11 | | 74 | 18 | 173 | | 104 | 16 | 375 | .3 | 3.8 | | 722 | .98 | -- | 258 | 174 | 59 | 4.7 | 1,380 | 7.7 |
| Dec. 1-14, 16---------- | a1.00 | 8.0 | | 103 | 28 | 259 | | 123 | 18 | 578 | .2 | 1.0 | | 1,060 | 1.44 | 2.86 | 372 | 271 | 60 | 5.8 | 2,020 | 7.6 |
| Dec. 15, 17-19--------- | 14.5 | 8.0 | | 50 | 11 | 115 | | 86 | 14 | 235 | .2 | 3.8 | | 479 | .65 | 18.8 | 170 | 100 | 60 | 3.8 | 948 | 7.6 |
| Dec. 20-31---------- | a .72 | 9.9 | | 78 | 19 | 213 | | 103 | 19 | 445 | .3 | 2.2 | | 837 | 1.14 | 1.63 | 272 | 188 | 63 | 5.6 | 1,630 | 7.3 |
| Jan. 1-4, 1960--------- | .70 | 7.9 | | 94 | 20 | 277 | | 102 | 28 | 570 | .4 | 1.0 | | 1,050 | 1.43 | 1.98 | 316 | 233 | 66 | 6.8 | 2,010 | 7.3 |
| Jan. 5, 7-11---------- | 9.12 | 8.7 | | 42 | 8.9 | 95 | | 74 | 11 | 194 | .3 | 2.5 | | b427 | .58 | 10.5 | 142 | 81 | 59 | 3.5 | 790 | 7.4 |
| Jan. 6, 12-13---------- | 205 | 9.8 | | 29 | 6.2 | 61 | | 62 | 18 | 112 | .3 | 4.2 | | 270 | .37 | 149 | 98 | 47 | 58 | 2.7 | 508 | 7.3 |
| Jan. 14-23---------- | 3.62 | 11 | | 42 | 9.4 | 86 | | 91 | 16 | 167 | .3 | 2.2 | | b410 | .56 | 4.01 | 144 | 69 | 56 | 3.1 | 726 | 7.2 |
| Jan. 24-31---------- | .18 | 12 | | 75 | 16 | 186 | | 122 | 31 | 370 | .3 | 3.8 | | b804 | 1.09 | .39 | 253 | 153 | 62 | 5.1 | 1,440 | 7.4 |
| Feb. 1-2, 17-29-------- | a .11 | 7.0 | | 114 | 27 | 284 | | 153 | 38 | 598 | .2 | 4.2 | | 1,150 | 1.56 | .34 | 396 | 270 | 61 | 6.2 | 2,210 | 7.2 |
| Feb. 3-6---------- | 260 | 12 | | 19 | 3.8 | 29 | | 55 | 9.6 | 48 | .3 | 3.5 | | 152 | .21 | 107 | 63 | 18 | 50 | 1.6 | 275 | 7.1 |
| Feb. 7-9---------- | .63 | 14 | | 44 | 9.6 | 80 | | 97 | 15 | 159 | .1 | 3.5 | | 373 | .51 | .63 | 150 | 70 | 54 | 2.8 | 720 | 7.2 |
| Feb. 10-16---------- | .11 | 10 | | 74 | 16 | 154 | | 134 | 25 | 315 | .1 | 5.1 | | 665 | .90 | .20 | 250 | 140 | 57 | 4.2 | 1,280 | 7.1 |
| Weighted average----- | c36.4 | 15 | | 16 | 3.8 | 27 | | 54 | 7.3 | 42 | 0.4 | 3.1 | | 140 | 0.19 | 13.8 | 56 | 11 | 51 | 1.6 | 242 | -- |

a Includes days of less than 0.05 cubic feet per second discharge.
b Residue on evaporation at 180°C.
c Represents 78 percent of flow for water year October 1959 to September 1960.

## 886. BRAZOS RIVER AT POSSUM KINGDOM DAM NEAR GRAFORD, TEX.

LOCATION.--Immediately below Possum Kingdom Dam, 2.6 miles upstream from Loving Creek, 11.3 miles southwest of Graford, Palo Pinto County, and 20 miles upstream from gaging station near Palo Pinto.
DRAINAGE AREA.--22,550 square miles, approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: January 1942 to September 1960.
Water temperatures: October 1949 to September 1955.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 2,220 ppm Jan. 1-21; minimum, 1,240 ppm Nov. 1-30.
Hardness: Maximum, 600 ppm Jan. 1-21; minimum, 376 ppm Nov. 1-30, Dec. 1-31.
Specific conductance: Maximum daily, 4,170 micromhos Jan. 12; minimum daily, 2,090 micromhos Dec. 23-27.
EXTREMES, 1942-60.--Dissolved solids: Maximum, 2,640 ppm Jan. 1-31, 1956; minimum, 331 ppm Apr. 26-30, May 1-10, 1957.
Hardness: Maximum, 828 ppm Jan. 1-31, 1956; minimum, 135 ppm Apr. 26-30, May 1-10, 1957.
Specific conductance: Maximum daily, 5,720 micromhos Jan. 7, 1956; minimum daily, 494 micromhos May 4, 1957.
Water temperatures (1949-55): Maximum, 76°F Sept. 27-30, 1950; minimum, 45°F on several days in February 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Palo Pinto for water year October 1959 to September 1960 given in Water-Supply Paper 1712. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-31, 1959 | 2,900 | 11 | | 123 | 21 | 310 | | 110 | 288 | 480 | -- | 0.8 | | 1,290 | 1.75 | 10,100 | 394 | 304 | 63 | 6.8 | 2,180 | 7.2 |
| Nov. 1-30 | 293 | 11 | | 118 | 20 | 298 | | 109 | 288 | 450 | -- | .5 | | 1,240 | 1.69 | 981 | 376 | 287 | 63 | 6.7 | 2,130 | 8.0 |
| Dec. 1-31 | 300 | 9.6 | | 118 | 20 | 305 | | 107 | 288 | 462 | -- | .5 | | 1,260 | 1.71 | 1,020 | 376 | 289 | 64 | 6.8 | 2,130 | 7.6 |
| Jan. 1-21, 1960 | 296 | 9.4 | | 188 | 32 | 577 | | 118 | 416 | 940 | -- | .8 | | 2,220 | 3.02 | 1,770 | 600 | 504 | 68 | 10 | 3,710 | 7.5 |
| Jan. 22-31 | 1,250 | 8.8 | | 150 | 24 | 396 | | 109 | 328 | 640 | -- | .8 | | 1,600 | 2.18 | 5,400 | 472 | 383 | 65 | 7.9 | 2,750 | 7.5 |
| Feb. 1-29 | 862 | 11 | | 140 | 23 | 388 | | 114 | 306 | 620 | -- | .8 | | 1,540 | 2.09 | 3,580 | 444 | 350 | 65 | 8.0 | 2,620 | 7.8 |
| Mar. 1-31 | 192 | 9.6 | | 135 | 24 | 399 | | 116 | 292 | 640 | -- | .8 | | 1,560 | 2.12 | 809 | 436 | 340 | 67 | 8.3 | 2,630 | 7.7 |
| Apr. 1-30 | 285 | 9.0 | | 140 | 29 | 429 | | 120 | 300 | 700 | 0.4 | 3.5 | | 1,670 | 2.27 | 1,290 | 468 | 370 | 67 | 8.6 | 2,850 | 7.5 |
| May 1-31 | 407 | 9.6 | | 128 | 20 | 365 | | 114 | 286 | 570 | -- | .8 | | 1,440 | 1.96 | 1,580 | 402 | 308 | 66 | 7.9 | 2,460 | 7.2 |
| June 1-30 | 172 | 9.6 | | 125 | 23 | 336 | | 114 | 267 | 542 | .5 | .5 | | 1,360 | 1.85 | 632 | 406 | 313 | 64 | 7.3 | 2,350 | 7.3 |
| July 1-31 | 2,087 | 9.4 | | 125 | 20 | 333 | | 116 | 263 | 530 | .3 | .8 | | 1,340 | 1.82 | 7,550 | 394 | 299 | 63 | 7.3 | 2,270 | 7.5 |
| Aug. 1-31 | 422 | 11 | | 130 | 22 | 359 | | 122 | 278 | 570 | .4 | .5 | | 1,430 | 1.94 | 1,630 | 415 | 315 | 65 | 7.6 | 2,430 | 7.7 |
| Sept. 1-30 | 411 | 11 | | 134 | 26 | 365 | | 124 | 288 | 590 | -- | .4 | | 1,480 | 2.01 | 1,640 | 442 | 340 | 64 | 7.6 | 2,500 | 7.5 |
| Weighted average | 749 | 10 | | 129 | 22 | 345 | | 114 | 288 | 546 | -- | 0.8 | | 1,400 | 1.90 | 2,830 | 412 | 319 | 63 | 7.4 | 2,370 | -- |

## 926. BRAZOS RIVER AT WHITNEY DAM NEAR WHITNEY, TEX.

LOCATION.--Immediately below Whitney Dam, 4.0 miles upstream from Iron Creek, 3.4 miles upstream from gaging station near Whitney, and 7.4 miles southwest of Whitney, Hill County.
DRAINAGE AREA.--26,170 square miles, approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to May 1948, October 1948 to September 1960.
Water temperatures: October 1947 to May 1948, October 1948 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 831 ppm Sept. 1-30; minimum, 589 ppm Mar. 1-24.
Hardness: Maximum, 280 ppm Sept. 1-30; minimum, 246 ppm Nov. 1-30.
Specific conductance: Maximum daily, 1,530 micromhos Sept. 27; minimum daily, 807 micromhos Oct. 17.
Water temperatures: Maximum, 81°F Aug. 1; minimum, 39°F Feb. 25.
EXTREMES, 1947-60.--Dissolved solids: Maximum, 1,560 ppm Oct. 1-10, 1948; minimum, 183 ppm June 11-20, 1952.
Hardness: Maximum, 542 ppm Oct. 1-10, 1948; minimum, 96 ppm June 11-20, 1952.
Specific conductance: Maximum daily, 2,660 micromhos Oct. 1, 1948; minimum daily, 203 micromhos May 23, 1952.
Water temperatures: Maximum, 92°F July 21, 28-29, 1957; minimum, freezing point Jan. 28-29, 1948.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.
No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-31, 1959 | 9,295 | 8.8 | | 78 | 14 | 160 | 5.3 | 115 | 138 | 258 | -- | 0.8 | | 739 | 1.01 | 18,550 | 252 | 158 | 57 | 4.4 | 1,240 | 7.5 |
| Nov. 1-30 | 664 | 12 | | 77 | 13 | 150 | | 122 | 135 | 235 | -- | .5 | | 710 | .97 | 1,270 | 246 | 146 | 57 | 4.2 | 1,200 | 7.6 |
| Dec. 1-31 | 1,277 | 11 | | 80 | 12 | 151 | | 130 | 140 | 230 | -- | 1.2 | | 699 | .95 | 2,410 | 249 | 142 | 57 | 4.2 | 1,180 | 7.7 |
| Jan. 1-31, 1960 | 2,801 | 15 | | 84 | 14 | 145 | | 148 | 137 | 225 | -- | 1.0 | | 718 | .98 | 5,430 | 267 | 146 | 54 | 3.9 | 1,190 | 7.7 |
| Feb. 1-29 | 1,914 | 10 | | 80 | 13 | 109 | | 166 | 108 | 170 | -- | 1.5 | | 598 | .81 | 3,090 | 253 | 117 | 48 | 3.0 | 1,010 | 7.8 |
| Mar. 1-24 | 968 | 9.6 | | 79 | 13 | 107 | | 169 | 106 | 165 | -- | 2.0 | | 589 | .80 | 1,540 | 250 | 112 | 48 | 2.9 | 977 | 7.7 |
| Mar. 25-31 | 760 | 9.0 | | 90 | 13 | 146 | | 179 | 132 | 220 | -- | 1.8 | | 732 | 1.00 | 1,500 | 278 | 132 | 53 | 3.8 | 1,210 | 7.7 |
| Apr. 1-30 | 989 | 11 | | 82 | 13 | 118 | 3.4 | 170 | 114 | 185 | 0.3 | 1.5 | | 667 | .91 | 1,780 | 258 | 118 | 49 | 3.2 | 1,070 | 7.4 |
| May 1-31 | 1,227 | 11 | | 76 | 14 | 119 | | 148 | 114 | 188 | -- | 1.8 | | 634 | .86 | 2,100 | 247 | 126 | 51 | 3.3 | 1,070 | 7.4 |
| June 1-30 | 557 | 10 | | 77 | 14 | 125 | | 153 | 115 | 195 | .4 | 1.2 | | 661 | .90 | 994 | 250 | 124 | 52 | 3.4 | 1,070 | 7.5 |
| July 1-31 | 1,656 | 11 | | 77 | 14 | 134 | | 155 | 118 | 205 | .3 | .8 | | 680 | .92 | 3,040 | 250 | 122 | 54 | 3.7 | 1,090 | 7.5 |
| Aug. 1-31 | 556 | 12 | | 85 | 16 | 155 | | 151 | 132 | 250 | -- | 2.8 | | 771 | 1.05 | 1,160 | 278 | 154 | 55 | 4.0 | 1,260 | 7.6 |
| Sept. 1-30 | 580 | 11 | | 84 | 17 | 176 | | 141 | 147 | 278 | -- | 1.0 | | 831 | 1.13 | 1,300 | 280 | 164 | 58 | 4.6 | 1,380 | 7.6 |
| Weighted average | 1,882 | 10 | | 79 | 14 | 147 | | 136 | 130 | 229 | -- | 1.1 | | 705 | 0.96 | 3,580 | 254 | 143 | 56 | 4.0 | 1,170 | -- |

## 1065. LITTLE RIVER AT CAMERON, TEX.

LOCATION.--At bridge on U. S. Highway 77, 2,020 feet downstream from gaging station, half a mile upstream from Gulf, Colorado, & Santa Fe Railway Co. bridge, and 2 miles southeast of Cameron, Milam County.
DRAINAGE AREA.--7,000 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960.
Water temperatures: October 1959 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 607 ppm Sept. 29; minimum, 130 ppm June 25-26.
Hardness: Maximum, 273 ppm June 1-24; minimum, 92 ppm June 25-26.
Specific conductance: Maximum daily, 1,000 micromhos Sept. 29; minimum daily, 191 micromhos June 26.
Water temperatures: Maximum, 89°F on several days during July and August; minimum, 40°F Jan. 19.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 29-31, 1959 | 5,700 | 14 | | 45 | 8.5 | 17 | | 157 | 20 | 24 | 0.4 | 0.0 | | a206 | 0.28 | 3,170 | 147 | 19 | 20 | 0.6 | 359 | 8.1 |
| Nov. 1-10 | 5,981 | 13 | | 50 | 8.3 | 21 | | 171 | 24 | 25 | .5 | 4.0 | | 242 | .33 | 3,910 | 159 | 19 | 22 | .7 | 394 | 7.2 |
| Nov. 11-20 | 6,729 | 13 | | 49 | 8.5 | 18 | | 167 | 21 | 24 | .5 | 3.0 | | 233 | .30 | 4,230 | 157 | 20 | 20 | .6 | 384 | 7.3 |
| Nov. 21-30 | 1,813 | 14 | | 71 | 13 | 25 | | 245 | 30 | 32 | .6 | 8.3 | | 332 | .45 | 1,630 | 230 | 30 | 19 | .7 | 538 | 7.4 |
| Dec. 1-15 | 1,076 | 12 | | 76 | 16 | 32 | | 270 | 36 | 40 | .3 | 10 | | a355 | .48 | 1,030 | 256 | 34 | 21 | .9 | 611 | 7.5 |
| Dec. 16 | 16,300 | -- | | 40 | 3.9 | -- | | 132 | -- | 7.0 | -- | -- | | -- | -- | -- | 116 | 8 | -- | -- | 277 | 8.1 |
| Dec. 17-31 | 5,723 | 13 | | 68 | 12 | 21 | | 234 | 29 | 26 | .3 | 6.9 | | a291 | .40 | 4,500 | 219 | 27 | 17 | .6 | 502 | 7.5 |
| Jan. 1-12, 1960 | 4,503 | 13 | | 74 | 12 | 25 | | 248 | 36 | 28 | .3 | 9.7 | | 322 | .44 | 3,910 | 234 | 31 | 19 | .7 | 542 | 7.5 |
| Jan. 13-31 | 5,824 | 12 | | 69 | 10 | 30 | | 234 | 33 | 32 | .3 | 7.9 | | 309 | .42 | 4,860 | 213 | 21 | 24 | .9 | 526 | 7.6 |
| Feb. 1-6 | 6,642 | 11 | | 63 | 12 | 25 | | 211 | 33 | 32 | .3 | 7.9 | | 300 | .41 | 5,380 | 206 | 34 | 21 | .8 | 485 | 7.8 |
| Feb. 7-20 | 4,372 | 12 | | 74 | 14 | 29 | | 256 | 34 | 36 | .3 | 9.7 | | 346 | .47 | 4,080 | 242 | 32 | 21 | .8 | 561 | 8.0 |
| Feb. 21-29 | 2,592 | 9.0 | | 80 | 17 | 29 | | 273 | 40 | 40 | .3 | 12 | | 370 | .50 | 2,590 | 270 | 46 | 19 | .8 | 620 | 7.9 |
| Mar. 1-13 | 2,468 | 12 | | 76 | 16 | 32 | | 254 | 45 | 43 | .4 | 12 | | 376 | .51 | 2,510 | 256 | 48 | 22 | .9 | 622 | 7.5 |
| Mar. 14-31 | 1,654 | 10 | | 76 | 17 | 35 | | 265 | 41 | 46 | .4 | 12 | | 385 | .52 | 1,720 | 260 | 42 | 23 | .9 | 641 | 7.5 |
| Apr. 1-14 | 1,210 | 11 | | 74 | 18 | 33 | 2.5 | 255 | 43 | 50 | .4 | 9.8 | | 378 | .51 | 1,230 | 258 | 50 | 22 | .9 | 645 | 7.4 |
| Apr. 15-28 | 940 | 13 | | 77 | 19 | 39 | | 268 | 48 | 54 | .4 | 11 | | 409 | .56 | 1,040 | 270 | 50 | 24 | 1.0 | 684 | 7.5 |
| Apr. 29-30 | 2,865 | 12 | | 55 | 10 | 28 | | 178 | 39 | 33 | .3 | 5.4 | | a271 | .37 | 2,100 | 178 | 32 | 25 | .9 | 476 | 7.5 |
| May 1-15 | 1,112 | 13 | | 74 | 17 | 37 | | 253 | 44 | 53 | .5 | 8.0 | | 386 | .52 | 1,160 | 254 | 47 | 24 | 1.0 | 642 | 7.7 |
| May 16-31 | 620 | 10 | | 74 | 19 | 43 | | 268 | 46 | 57 | .4 | 7.7 | | 402 | .55 | 673 | 262 | 43 | 26 | 1.2 | 683 | 7.3 |
| June 1-24 | 268 | 13 | | 70 | 24 | 50 | | 276 | 48 | 70 | .4 | 7.6 | | 421 | .57 | 305 | 273 | 47 | 28 | 1.3 | 727 | 7.4 |
| June 25-26 | 630 | 13 | | -- | -- | 10 | | 120 | 6.8 | 4.0 | .5 | 2.2 | | 130 | .18 | 221 | 92 | 0 | 19 | .5 | 191 | 7.1 |
| June 27-30 | 640 | 16 | | 70 | 15 | 48 | | 218 | 75 | 54 | .7 | 8.0 | | a394 | .54 | 681 | 236 | 58 | 31 | 1.4 | 636 | 7.1 |
| July 1-21 | 253 | 14 | | 64 | 21 | 57 | | 256 | 48 | 74 | .4 | 5.7 | | 436 | .59 | 298 | 246 | 36 | 34 | 1.6 | 692 | 7.6 |
| July 22-31 | 269 | 13 | | 54 | 13 | 36 | | 207 | 31 | 42 | .4 | 5.4 | | 312 | .42 | 227 | 188 | 18 | 29 | 1.1 | 503 | 7.5 |
| Aug. 1-10 | 132 | 14 | | 66 | 21 | 49 | | 256 | 46 | 67 | .4 | 5.8 | | 410 | .56 | 146 | 251 | 41 | 30 | 1.3 | 673 | 7.6 |
| Aug. 11-20 | 270 | 13 | | 58 | 16 | 46 | | 222 | 35 | 61 | .4 | 5.6 | | 365 | .50 | 266 | 210 | 28 | 32 | 1.4 | 600 | 7.3 |
| Aug. 21-31 | 205 | 15 | | 62 | 18 | 49 | | 245 | 38 | 63 | .4 | 6.6 | | 396 | .54 | 219 | 228 | 28 | 32 | 1.4 | 645 | 7.4 |
| Sept. 1-14 | 129 | 14 | | 66 | 20 | 50 | | 254 | 50 | 64 | .4 | 5.6 | | 406 | .55 | 141 | 246 | 38 | 31 | 1.4 | 684 | 7.6 |
| Sept. 15-26 | 59.8 | 12 | | 67 | 24 | 57 | | 281 | 52 | 71 | .4 | 5.8 | | 436 | .59 | 70.4 | 266 | 35 | 32 | 1.5 | 747 | 7.5 |
| Sept. 27-28, 30 | 491 | 15 | | 52 | 18 | 46 | | 209 | 32 | 66 | .4 | 6.0 | | a338 | .46 | 448 | 204 | 32 | 33 | 1.4 | 603 | 7.6 |
| Sept. 29 | 375 | -- | | -- | -- | -- | | 194 | -- | 203 | -- | -- | | 607 | .83 | 615 | 236 | 77 | -- | -- | 1,000 | 7.5 |
| Weighted average | b2,139 | 12 | | 66 | 12 | 27 | | 226 | 33 | 34 | 0.4 | 7.5 | | 311 | 0.42 | 1,800 | 214 | 29 | 21 | 0.8 | 520 | -- |

a Calculated from determined constituents.
b Represents 71 percent of runoff for water year October 1959 to September 1960.

## 1110. NAVASOTA RIVER NEAR BRYAN, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 190, 2.5 miles upstream from Shepherd Creek and 17 miles northeast of Bryan, Brazos County.
DRAINAGE AREA.--1,439 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1958 to September 1960.
Water temperatures: October 1958 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,130 ppm June 25; minimum, 100 ppm Dec. 18-21.
Hardness: Maximum, 355 ppm June 25; minimum, 32 ppm Dec. 18-21.
Specific conductance: Maximum daily, 2,110 micromhos June 25; minimum daily, 125 micromhos Dec. 20.
Water temperatures: Maximum, 87°F July 31; minimum, 40°F Feb. 26, Mar. 3.
EXTREMES, 1958-60.--Dissolved solids: Maximum, 1,130 ppm June 25, 1960; minimum, 72 ppm Feb. 15, 1959.
Hardness: Maximum, 355 ppm June 25, 1960; minimum, 27 ppm Feb. 15, 1959.
Specific conductance: Maximum daily, 2,370 micromhos Sept. 22, 1959; minimum daily, 114 micromhos Feb. 15, 1959.
Water temperatures: Maximum, 89°F Aug. 4, 1959; minimum, 38°F Jan. 4-5, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1, 3, 5-6, 9, 1959 | 246 | 11 | | 19 | 4.9 | 60 | 5.0 | 52 | 22 | 96 | -- | 0.8 | | 245 | 0.33 | 163 | 68 | 25 | 64 | 3.2 | 464 | 6.8 |
| Oct. 2, 4, 8---------- | 312 | 15 | | 12 | 3.4 | 36 | | 36 | 18 | 52 | -- | 1.0 | | 155 | .21 | 131 | 44 | 14 | 64 | 2.4 | 273 | 6.8 |
| Oct. 7---------- | 391 | -- | | -- | -- | -- | | 75 | -- | 392 | -- | -- | | -- | -- | -- | 306 | 244 | -- | -- | 1,430 | 7.4 |
| Oct. 10-16, 18--------- | 1,394 | 13 | | 22 | 4.7 | 80 | | 64 | 13 | 129 | -- | .8 | | 294 | .40 | 1,110 | 74 | 22 | 70 | 4.0 | 564 | 6.9 |
| Oct. 17, 19-23--------- | 743 | 14 | | 19 | 4.1 | 49 | | 67 | 14 | 72 | -- | .8 | | 206 | .28 | 413 | 64 | 9 | 63 | 2.7 | 381 | 6.8 |
| Oct. 24-31---------- | 58.8 | 15 | | 29 | 6.3 | 86 | | 85 | 22 | 137 | -- | .8 | | 338 | .46 | 53.7 | 98 | 29 | 66 | 3.8 | 632 | 7.1 |
| Nov. 1-3---------- | 220 | 18 | | 31 | 6.8 | 97 | | 106 | 27 | 143 | -- | .8 | | a391 | .53 | 232 | 106 | 18 | 67 | 4.1 | 663 | 7.1 |
| Nov. 4-13---------- | 1,402 | 12 | | 12 | 2.9 | 29 | | 44 | 15 | 38 | -- | .8 | | 132 | .18 | 500 | 42 | 6 | 60 | 1.9 | 232 | 7.1 |
| Nov. 14-20---------- | 193 | 16 | | 24 | 5.5 | 45 | | 74 | 30 | 62 | -- | .5 | | 219 | .30 | 114 | 82 | 22 | 54 | 2.2 | 393 | 7.4 |
| Nov. 21-30---------- | 103 | 17 | | 38 | 9.7 | 71 | | 101 | 48 | 110 | -- | .5 | | a361 | .49 | 100 | 135 | 52 | 53 | 2.7 | 623 | 7.7 |
| Dec. 1-15---------- | 131 | 19 | | 44 | 10 | 69 | | 101 | 53 | 115 | -- | .0 | | a394 | .54 | 139 | 151 | 68 | 50 | 2.4 | 637 | 7.5 |
| Dec. 16-17, 22--------- | 2,827 | 10 | | 17 | 3.9 | 38 | | 41 | 25 | 57 | -- | 1.0 | | 172 | .23 | 1,310 | 58 | 25 | 58 | 2.2 | 306 | 7.0 |
| Dec. 18-21---------- | 6,618 | 14 | | 9.0 | 2.2 | 20 | | 34 | 14 | 23 | -- | .5 | | 100 | .14 | 1,790 | 32 | 4 | 58 | 1.5 | 154 | 6.5 |
| Dec. 23-31---------- | 1,153 | 18 | | 33 | 8.4 | 95 | | 73 | 38 | 159 | -- | .8 | | 388 | .53 | 1,210 | 117 | 57 | 64 | 3.8 | 709 | 7.5 |
| Jan. 1-3, 10, 28-31, 1960---------- | 574 | 14 | | 35 | 9.6 | 65 | | 72 | 57 | 106 | 0.2 | .5 | | a353 | .48 | 547 | 127 | 68 | 53 | 2.5 | 580 | 7.0 |
| Jan. 4-9, 11-27-------- | 1,883 | 12 | | 22 | 4.8 | 42 | | 59 | 28 | 62 | .2 | .8 | | 201 | .27 | 1,020 | 75 | 26 | 55 | 2.1 | 356 | 6.7 |
| Feb. 1-3---------- | 281 | 16 | | 44 | 9.0 | 68 | | 88 | 71 | 105 | .2 | .5 | | 357 | .49 | 271 | 147 | 75 | 50 | 2.4 | 632 | 7.2 |
| Feb. 4-11---------- | 908 | 13 | | 27 | 6.9 | 40 | | 60 | 43 | 63 | .1 | .5 | | 224 | .30 | 549 | 96 | 47 | 48 | 1.8 | 399 | 7.1 |
| Feb. 12-21---------- | 234 | 14 | | 44 | 9.0 | 68 | | 94 | 68 | 104 | .2 | .2 | | a379 | .52 | 239 | 147 | 70 | 50 | 2.4 | 625 | 7.3 |
| Feb. 22-29---------- | 784 | 11 | | 31 | 8.9 | 46 | | 58 | 59 | 74 | .1 | .2 | | 259 | .35 | 548 | 114 | 66 | 47 | 1.9 | 463 | 6.9 |
| Mar. 1-7---------- | 1,094 | 10 | | 25 | 6.4 | 48 | | 72 | 44 | 62 | .4 | .8 | | 232 | .32 | 685 | 89 | 30 | 54 | 2.2 | 379 | 7.3 |
| Mar. 8-17---------- | 516 | 13 | | 43 | 11 | 113 | | 79 | 64 | 188 | .4 | 1.0 | | a518 | .70 | 722 | 152 | 88 | 62 | 4.0 | 860 | 7.4 |
| Mar. 18-27---------- | 150 | 17 | | 52 | 16 | 91 | | 95 | 94 | 152 | .5 | .5 | | 470 | .64 | 190 | 196 | 118 | 50 | 2.8 | 816 | 7.7 |
| Mar. 28-31---------- | 817 | 10 | | 35 | 11 | 61 | | 56 | 70 | 102 | .3 | .8 | | 318 | .43 | 701 | 132 | 86 | 50 | 2.3 | 567 | 7.3 |
| Apr. 1-10---------- | 162 | 15 | | 40 | 13 | 70 | 4.4 | 74 | 73 | 124 | -- | .5 | | 376 | .51 | 164 | 154 | 93 | 49 | 2.4 | 679 | 7.3 |
| Apr. 11-20---------- | 70.3 | 17 | | 53 | 17 | 95 | | 96 | 94 | 164 | -- | .5 | | 488 | .66 | 92.6 | 202 | 124 | 50 | 2.9 | 877 | 7.3 |
| Apr. 21-30---------- | 121 | 18 | | 51 | 14 | 86 | | 87 | 99 | 140 | -- | .5 | | 452 | .61 | 148 | 184 | 113 | 50 | 2.8 | 799 | 7.0 |
| May 1, 5-8---------- | 1,221 | 12 | | 35 | 9.0 | 107 | | 69 | 41 | 183 | -- | .5 | | 422 | .57 | 1,390 | 124 | 68 | 65 | 4.2 | 809 | 7.4 |
| May 2-4---------- | 2,033 | 10 | | 20 | 5.4 | 51 | | 48 | 32 | 77 | -- | 1.0 | | 220 | .30 | 1,210 | 72 | 33 | 60 | 2.6 | 408 | 7.1 |
| May 9-20---------- | 104 | 14 | | 44 | 12 | 135 | | 101 | 54 | 222 | -- | 1.2 | | a561 | .76 | 158 | 160 | 76 | 65 | 4.6 | 1,000 | 7.3 |
| May 21-31---------- | 75.6 | 15 | | 47 | 13 | 105 | | 101 | 67 | 174 | -- | .8 | | a477 | .65 | 97.4 | 171 | 88 | 57 | 3.5 | 865 | 7.3 |
| June 1-8---------- | 28.9 | 16 | | 62 | 16 | 206 | | 116 | 73 | 350 | .3 | 2.5 | | a840 | 1.14 | 65.5 | 220 | 126 | 67 | 6.0 | 1,440 | 7.2 |
| June 9-19---------- | 39.5 | 17 | | 40 | 12 | 85 | | 96 | 59 | 137 | .3 | 1.0 | | a422 | .57 | 45.0 | 150 | 71 | 55 | 3.0 | 715 | 7.1 |
| June 20-24, 26--------- | 79.8 | 12 | | 63 | 16 | 157 | | 114 | 62 | 285 | .4 | 3.0 | | a709 | .96 | 153 | 223 | 130 | 60 | 4.6 | 1,210 | 7.0 |
| June 25---------- | 24.0 | -- | | -- | -- | -- | | 119 | -- | 578 | -- | -- | | 1,130 | 1.54 | 73.2 | 355 | 258 | -- | -- | 2,110 | 7.2 |
| June 27-30---------- | 824 | 10 | | 16 | 4.6 | 35 | | 36 | 26 | 54 | .2 | 1.2 | | 165 | .22 | 367 | 59 | 29 | 56 | 2.0 | 291 | 6.7 |
| July 1---------- | 1,100 | -- | | -- | -- | -- | | 56 | -- | 136 | -- | -- | | -- | -- | -- | 77 | 31 | -- | -- | 577 | 6.8 |
| July 2-14---------- | 221 | 12 | | 36 | 8.8 | 158 | | 84 | 28 | 262 | -- | 1.0 | | a599 | .81 | 357 | 126 | 57 | 73 | 6.1 | 1,040 | 7.3 |
| July 15-17---------- | 68.0 | 13 | | 22 | 5.8 | 72 | | 57 | 30 | 112 | -- | 1.5 | | 284 | .39 | 52.1 | 79 | 32 | 67 | 3.5 | 528 | 7.2 |
| July 18-31---------- | 107 | 11 | | 18 | 4.9 | 42 | | 48 | 29 | 61 | -- | 1.0 | | 191 | .26 | 55.2 | 65 | 26 | 58 | 2.3 | 351 | 6.8 |

a Residue on evaporation at 180°C.

1110. NAVASOTA RIVER NEAR BRYAN, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Aug. 1-10, 1960------- | 6.51 | 18 | | 26 | 7.4 | 56 | | 72 | 38 | 83 | -- | 0.8 | | 264 | 0.36 | 4.64 | 95 | 36 | 56 | 2.5 | 468 | 7.1 |
| Aug. 11-22, 24, 27---- | 39.7 | 13 | | 29 | 7.8 | 60 | | 72 | 40 | 95 | -- | .5 | | 280 | .38 | 30.0 | 104 | 45 | 56 | 2.6 | 507 | 6.9 |
| Aug. 23, 25-26-------- | 184 | 12 | | 14 | 4.1 | 32 | | 34 | 29 | 45 | -- | 1.0 | | 154 | .21 | 76.5 | 52 | 24 | 58 | 1.9 | 278 | 6.9 |
| Aug. 28-31------------ | 30.8 | 13 | | 35 | 9.7 | 108 | | 46 | 40 | 200 | -- | .5 | | 429 | .58 | 35.7 | 128 | 90 | 65 | 4.1 | 806 | 7.0 |
| Sept. 1-7------------- | 26.1 | 11 | | 22 | 5.6 | 57 | | 52 | 34 | 87 | -- | .8 | | 243 | .33 | 17.1 | 78 | 35 | 61 | 2.8 | 444 | 7.4 |
| Sept. 8-19------------ | 5.78 | 16 | | 22 | 6.0 | 41 | | 57 | 38 | 58 | -- | .8 | | 210 | .29 | 3.28 | 80 | 33 | 53 | 2.0 | 372 | 7.1 |
| Sept. 20-30----------- | 9.54 | 11 | | 24 | 7.8 | 43 | | 61 | 42 | 65 | -- | .5 | | 223 | .30 | 5.74 | 92 | 42 | 50 | 1.9 | 411 | 7.0 |
| Weighted average---- | 532 | 13 | | 24 | 6.0 | 54 | | 59 | 33 | 85 | -- | 0.7 | | 248 | 0.34 | 356 | 85 | 36 | 58 | 2.5 | 438 | -- |

## 1140. BRAZOS RIVER AT RICHMOND, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59 in Richmond, Fort Bend County, 925 feet downstream from Texas & New Orleans Railroad bridge, and at mile 93.
DRAINAGE AREA.--44,020 square miles, approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1960.
Water temperatures: November 1950 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 694 ppm Sept. 18-30; minimum, 155 ppm June 26-27, 29-30.
Hardness: Maximum, 276 ppm Sept. 18-30; minimum, 88 ppm June 26-27, 29-30.
Specific conductance: Maximum daily, 1,220 micromhos Sept. 26; minimum daily, 226 micromhos May 2.
Water temperatures: Maximum, 88°F Oct. 8, July 30-31, Aug. 1; minimum, 40°F Feb. 23.
EXTREMES, 1945-60.--Dissolved solids: Maximum, 1,400 ppm Sept. 1-10, 1951; minimum, 133 ppm Aug. 27-31, 1947.
Hardness: Maximum, 446 ppm Sept. 1-10, 1948; minimum, 74 ppm Jan. 13-14, 18-20, 1950.
Specific conductance: Maximum daily, 2,540 micromhos Sept. 4, 1951; minimum daily, 187 micromhos Aug. 31, 1947.
Water temperatures (1950-60): Maximum, 91°F Aug. 5, 1951; minimum, 39°F Jan. 4, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C): Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1-7, 1959 | 5,231 | 12 | | 71 | 15 | 121 | 5.0 | 161 | 108 | 192 | -- | 1.2 | | 638 | 0.87 | 9,010 | 238 | 106 | 52 | 3.4 | 1,070 | 7.7 |
| Oct. 8-11 | 48,450 | 13 | | 36 | 5.7 | 13 | 3.8 | 123 | 20 | 15 | -- | 2.2 | | a169 | .23 | 22,110 | 114 | 12 | 19 | .5 | 286 | 7.6 |
| Oct. 12, 18-19, 26-31 | 20,690 | 12 | | 46 | 8.4 | 39 | 4.1 | 132 | 43 | 61 | -- | 4.2 | | 292 | .40 | 16,310 | 150 | 42 | 35 | 1.4 | 499 | 7.3 |
| Oct. 13-17, 20-25 | 28,800 | 11 | | 58 | 10 | 74 | 4.6 | 128 | 70 | 124 | -- | 2.2 | | 441 | .60 | 34,290 | 186 | 80 | 46 | 2.4 | 746 | 7.3 |
| Nov. 1-10 | 13,970 | 14 | | 46 | 6.2 | 30 | 4.0 | 138 | 37 | 43 | -- | 2.5 | | 262 | .36 | 9,880 | 140 | 28 | 31 | 1.1 | 440 | 7.8 |
| Nov. 11-16, 18-20 | 9,856 | 14 | | 50 | 8.1 | 30 | 4.3 | 156 | 37 | 44 | -- | 2.5 | | 278 | .38 | 7,400 | 158 | 30 | 28 | 1.0 | 463 | 7.7 |
| Nov. 17 | 10,900 | -- | | -- | -- | -- | -- | 160 | -- | 168 | -- | -- | | -- | -- | -- | 174 | 43 | -- | -- | 867 | 8.2 |
| Nov. 21-30 | 6,295 | 14 | | 56 | 9.3 | 32 | 4.1 | 180 | 38 | 47 | -- | 2.5 | | 304 | .41 | 5,170 | 178 | 30 | 28 | 1.0 | 505 | 8.0 |
| Dec. 1-16 | 3,695 | 15 | | 76 | 13 | 54 | 3.2 | 227 | 64 | 80 | -- | 4.5 | | 440 | .60 | 4,390 | 243 | 57 | 32 | 1.5 | 728 | 7.6 |
| Dec. 17-22 | 23,630 | 13 | | 44 | 6.3 | 27 | 4.0 | 127 | 40 | 38 | -- | 4.2 | | 257 | .35 | 16,400 | 136 | 32 | 29 | 1.0 | 413 | 7.5 |
| Dec. 23-31 | 14,500 | 11 | | 52 | 7.5 | 34 | 4.3 | 147 | 44 | 53 | -- | 3.8 | | 308 | .42 | 12,060 | 160 | 40 | 31 | 1.2 | 490 | 7.0 |
| Jan. 1-10, 1960 | 16,730 | 16 | | 57 | 8.2 | 35 | 3.9 | 165 | 47 | 53 | -- | 3.8 | | 310 | .42 | 14,000 | 176 | 40 | 30 | 1.1 | 517 | 7.8 |
| Jan. 11-20 | 18,500 | 14 | | 60 | 9.0 | 48 | 3.7 | 163 | 58 | 73 | -- | 4.2 | | 358 | .49 | 17,880 | 186 | 53 | 35 | 1.5 | 606 | 7.5 |
| Jan. 21-31 | 14,520 | 14 | | 60 | 9.6 | 43 | 3.5 | 169 | 54 | 64 | -- | 4.0 | | 344 | .47 | 13,490 | 189 | 50 | 33 | 1.4 | 581 | 7.4 |
| Feb. 1-10 | 15,490 | 8.8 | | 61 | 10 | 36 | 3.5 | 176 | 50 | 56 | 0.3 | 4.5 | | 334 | .45 | 13,970 | 193 | 49 | 28 | 1.1 | 552 | 7.7 |
| Feb. 11-20 | 10,900 | 10 | | 65 | 11 | 44 | 3.0 | 180 | 58 | 71 | .3 | 4.5 | | 379 | .52 | 11,150 | 207 | 60 | 31 | 1.3 | 620 | 7.8 |
| Feb. 21-29 | 10,230 | 12 | | 62 | 10 | 30 | 3.2 | 188 | 42 | 48 | .3 | 4.5 | | 322 | .44 | 8,890 | 200 | 46 | 24 | .9 | 522 | 7.6 |
| Mar. 1-10 | 8,607 | 12 | | 65 | 11 | 45 | 3.0 | 176 | 62 | 66 | .7 | 5.0 | | 375 | .51 | 8,710 | 207 | 63 | 32 | 1.4 | 609 | 7.6 |
| Mar. 11-20 | 6,373 | 11 | | 70 | 13 | 51 | 3.4 | 195 | 60 | 77 | .4 | 8.1 | | 411 | .56 | 7,070 | 228 | 68 | 32 | 1.5 | 669 | 7.8 |
| Mar. 21-31 | 4,224 | 7.6 | | 72 | 16 | 56 | 2.8 | 212 | 70 | 81 | .5 | 4.8 | | 439 | .60 | 5,010 | 246 | 72 | 33 | 1.6 | 719 | 7.7 |
| Apr. 1-10 | 4,104 | 10 | | 65 | 13 | 54 | 3.4 | 180 | 71 | 82 | -- | 4.0 | | 404 | .55 | 4,480 | 216 | 68 | 35 | 1.6 | 672 | 8.0 |
| Apr. 11-20 | 2,642 | 9.4 | | 64 | 16 | 62 | 3.3 | 191 | 75 | 92 | -- | 2.5 | | 422 | .57 | 3,010 | 226 | 69 | 37 | 1.8 | 726 | 7.9 |
| Apr. 21-30 | 3,983 | 7.8 | | 60 | 15 | 62 | 3.4 | 180 | 71 | 91 | -- | 2.5 | | 414 | .56 | 4,450 | 211 | 64 | 39 | 1.9 | 701 | 7.7 |
| May 1-5 | 23,940 | 12 | | 36 | 5.0 | 19 | 3.4 | 104 | 30 | 25 | -- | 3.5 | | a185 | .25 | 11,960 | 110 | 26 | 27 | .8 | 321 | 7.8 |
| May 6-9 | 9,062 | 14 | | 45 | 7.2 | 41 | 4.0 | 117 | 51 | 59 | -- | 2.8 | | a282 | .38 | 6,900 | 142 | 46 | 38 | 1.5 | 487 | 7.1 |
| May 10-31 | 3,856 | 11 | | 62 | 12 | 76 | 4.4 | 159 | 74 | 114 | -- | 1.2 | | 443 | .60 | 4,610 | 204 | 74 | 44 | 2.3 | 763 | 7.3 |
| June 1-10 | 1,384 | 13 | | 59 | 16 | 76 | | 175 | 85 | 103 | -- | .8 | | 466 | .63 | 1,740 | 213 | 70 | 44 | 2.3 | 769 | 7.6 |
| June 11-24 | 925 | 15 | | 60 | 17 | 90 | | 181 | 87 | 124 | -- | .5 | | 504 | .69 | 1,260 | 220 | 71 | 47 | 2.6 | 840 | 7.6 |
| June 25, 28 | 27,240 | 12 | | 42 | 9.0 | 46 | | 137 | 46 | 58 | -- | 2.0 | | a282 | .38 | 20,740 | 143 | 30 | 41 | 1.7 | 491 | 7.6 |
| June 26-27, 29-30 | 32,180 | 11 | | 29 | 3.9 | 17 | | 100 | 16 | 18 | -- | 1.2 | | 155 | .21 | 13,470 | 88 | 6 | 29 | .8 | 245 | 7.4 |
| July 1-8 | 8,272 | 14 | | 32 | 4.7 | 29 | | 116 | 27 | 26 | -- | 2.2 | | 211 | .29 | 4,710 | 100 | 4 | 38 | 1.3 | 311 | 7.0 |
| July 9-13 | 2,570 | 18 | | 46 | 7.3 | 51 | | 133 | 43 | 72 | -- | 1.5 | | a304 | .41 | 2,110 | 145 | 36 | 43 | 1.8 | 529 | 7.2 |
| July 14-19 | 3,605 | 8.8 | | 61 | 11 | 83 | | 154 | 76 | 122 | -- | 1.0 | | a439 | .60 | 4,270 | 197 | 71 | 48 | 2.6 | 782 | 7.4 |
| July 20-24, 26-31 | 5,239 | 13 | | 51 | 8.2 | 67 | | 130 | 60 | 97 | -- | 1.5 | | a362 | .49 | 5,120 | 160 | 54 | 48 | 2.3 | 642 | 7.6 |
| July 25 | 7,650 | -- | | -- | -- | -- | | 107 | -- | 41 | -- | -- | | -- | -- | -- | 105 | 18 | -- | -- | 361 | 7.2 |
| Aug. 1-10 | 1,676 | 15 | | 74 | 13 | 106 | | 182 | 91 | 159 | .4 | .5 | | 570 | .78 | 2,580 | 238 | 89 | 49 | 3.0 | 930 | 7.6 |
| Aug. 11-20 | 1,547 | 16 | | 72 | 14 | 96 | | 198 | 82 | 139 | .3 | .2 | | 547 | .74 | 2,280 | 237 | 74 | 47 | 2.7 | 881 | 7.2 |
| Aug. 21-31 | 2,150 | 13 | | 61 | 12 | 83 | | 168 | 74 | 117 | .3 | .5 | | 489 | .64 | 2,720 | 202 | 54 | 47 | 2.5 | 758 | 7.3 |
| Sept. 1-5 | 1,840 | 17 | | 48 | 9.2 | 53 | | 150 | 48 | 71 | -- | 1.0 | | 335 | .46 | 1,660 | 158 | 35 | 42 | 1.8 | 555 | 7.6 |
| Sept. 6-17 | 1,122 | 17 | | 70 | 15 | 90 | | 203 | 81 | 127 | -- | 3.2 | | 533 | .72 | 1,610 | 236 | 70 | 45 | 2.5 | 869 | 7.7 |
| Sept. 18-30 | 954 | 17 | | 81 | 18 | 134 | | 211 | 110 | 198 | -- | .8 | | 694 | .94 | 1,790 | 276 | 103 | 51 | 3.5 | 1,140 | 7.6 |
| Weighted average | 8,869 | 12 | | 54 | 9.0 | 48 | | 151 | 50 | 67 | -- | 3.2 | | 331 | 0.45 | 7,930 | 172 | 48 | 38 | 1.6 | 552 | -- |

a Calculated from determined constituents.

MISCELLANEOUS ANALYSES OF STREAMS IN BRAZOS RIVER BASIN IN TEXAS

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| **797. TRIBUTARY TO DOUBLE MOUNTAIN FORK BRAZOS RIVER NEAR JUSTICEBURG** | | | | | | | | | | | | | | | | | | | | | | |
| Dec. 17, 1959 | 3.96 | | | | | 66 | 1.6 | 156 | 15 | 9 | 1.9 | 5 | | | | | 24 | 0 | 85 | | 306 | 7.8 |
| **799. ROUGH CREEK AT MOUTH NEAR ROTAN** | | | | | | | | | | | | | | | | | | | | | | |
| Nov. 19, 1959 | 0 | | | | | | | | | 47 | | | | | | | | | | | 1,900 | |
| Jan. 20, 1960 | .08 | | | | | | | | 1,140 | 56 | | | | | | | | | | | 2,020 | |
| Feb. 19 | 0 | | | | | | | | | 57 | | | | | | | | | | | 2,090 | |
| May 12 | 0 | | | | | | | | | 1,440 | | | | | | | | | | | 7,690 | |
| June 17 | 0 | | | | | | | | | 360 | | | | | | | | | | | 3,470 | |
| July 27 | 0 | | | | | | | | | 42 | | | | | | | | | | | 1,800 | |
| Aug. 18 | 0 | | | | | | | | | 43 | | | | | | | | | | | 1,700 | |
| **805.5. McDONALD CREEK AT MOUTH NEAR POST** | | | | | | | | | | | | | | | | | | | | | | |
| Nov. 18, 1959 | 0 | | | | | | | | | 7,650 | | | | | | | | | | | 21,200 | |
| Dec. 17 | 12.7 | | | | | 1,160 | | 172 | -- | 1,730 | | | | | | | 320 | 179 | 89 | | 5,850 | 7.9 |
| Jan. 20, 1960 | .22 | | | | | | | | 238 | 13,200 | | | | | | | | | | | 33,800 | |
| Feb. 18 | a .01 | | | | | | | | 1,670 | 13,600 | | | | | | | | | | | 35,000 | |
| Mar. 15 | 0 | | | | | | | | 1,910 | 15,900 | | | | | | | | | | | 40,400 | |
| | | | | | | | | | -- | | | | | | | | | | | | | |
| **808. WHITE RIVER NEAR CROSBYTON** | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 15, 1960 | 0.47 | | | | | -- | -- | 446 | 60 | 24 | | | | | | | 274 | 0 | -- | | 782 | 7.9 |
| June 22 | 3.62 | | | | | 22 | 8.5 | 203 | 19 | 8 | | | | | | | 137 | 0 | 24 | | 358 | 8.0 |
| Sept. 21 | .65 | | | | | 62 | 11 | 366 | 50 | 22 | | | | | | | 234 | 0 | 35 | | 698 | 8.1 |
| **809. WHITE RIVER BELOW FALLS NEAR CROSBYTON** | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 15, 1960 | 1.01 | | | | | -- | -- | 402 | 63 | 24 | | | | | | | 270 | 0 | -- | | 763 | 8.0 |
| June 22 | 4.36 | | | | | 30 | 9.1 | 225 | 21 | 12 | | | | | | | 149 | 0 | 29 | | 413 | 8.0 |
| Sept. 21 | .62 | | | | | 57 | 9.4 | 325 | 44 | 21 | | | | | | | 200 | 0 | 37 | | 617 | 8.0 |

a Field estimate.

MISCELLANEOUS ANALYSES OF STREAMS IN BRAZOS RIVER BASIN IN TEXAS--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| **809.2. RED MUD CREEK AT MOUTH NEAR CLAIREMONT** | | | | | | | | | | | | | | | | | | | | | | |
| Jan. 20, 1960 | 0.11 | | | | | -- | | | 1,490 | 432 | | | | | | | -- | | -- | | 3,470 | |
| Feb. 18 | 0 | | | | | -- | | | -- | 325 | | | | | | | -- | | -- | | 3,600 | |
| May 12 | 0 | | | | | -- | | | -- | 7,040 | | | | | | | -- | | -- | | 21,600 | |
| June 15 | a .01 | | | | | 186 | 11 | 80 | 620 | 250 | | | | | | | 630 | 564 | 39 | | 1,940 | 7.3 |
| July 26 | a .01 | | | | | 4,680 | | | 2,010 | 7,920 | | | | | | | 3,320 | | 75 | | 22,100 | |
| Aug. 17 | 0 | | | | | -- | | | -- | 6,700 | | | | | | | -- | | -- | | 20,200 | |
| Sept. 22 | 0 | | | | | -- | | | -- | 10,900 | | | | | | | -- | | -- | | 29,400 | |
| **LITTLE RED MUD CREEK AT MOUTH NEAR CLAIREMONT** | | | | | | | | | | | | | | | | | | | | | | |
| Nov. 18, 1959 | 0 | | | | | | | 147 | | 330 | | | | | | | 514 | 394 | | | 1,690 | 8.1 |
| **809.6. BUTTE CREEK AT MOUTH NEAR JAYTON** | | | | | | | | | | | | | | | | | | | | | | |
| Dec. 17, 1959 | 0.60 | | | | | 30 | 4.8 | 112 | 1,260 | 22 | | | | | | | 1,320 | 1,230 | 5 | | 2,090 | 7.9 |
| Jan. 20, 1960 | 0 | | | | | | | | | 2,060 | | | | | | | | | | | 8,510 | |
| June 15 | 0 | | | | | | | | | 2,940 | | | | | | | | | | | 11,000 | |
| July 26 | 0 | | | | | | | | | 385 | | | | | | | | | | | 2,460 | |
| **810.5. SHORT CROTON CREEK AT MOUTH NEAR JAYTON** | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 20, 1959 | 0.01 | | | | | 12,900 | | | 3,810 | 20,200 | | | | | | | 5,010 | | 85 | | 49,700 | |
| Nov. 19 | .01 | | | | | -- | | | 3,350 | 18,300 | | | | | | | -- | | -- | | 44,600 | |
| Jan. 21, 1960 | .10 | | | | | -- | | | 3,350 | 19,700 | | | | | | | -- | | -- | | 47,600 | |
| Feb. 18 | .02 | | | | | 14,800 | | | 3,610 | 23,100 | | | | | | | 4,700 | | 87 | | 53,400 | |
| Apr. 15 | .01 | | | | | 11,500 | | | 3,490 | 18,100 | | | | | | | 4,490 | | 85 | | 41,900 | |
| May 11 | 0 | | | | | -- | | | -- | 21,900 | | | | | | | -- | | -- | | 54,000 | |
| June 15 | 0 | | | | | -- | | | -- | 20,700 | | | | | | | -- | | -- | | 49,000 | |
| July 26 | .02 | | | | | 8,170 | | | 3,250 | 12,900 | | | | | | | 4,150 | | 81 | | 34,000 | |
| Aug. 17 | 0 | | | | | -- | | | -- | 27,600 | | | | | | | -- | | -- | | 62,100 | |
| Sept. 21 | .01 | | | | | 9,090 | | | 3,410 | 14,500 | | | | | | | 4,220 | | 82 | | 37,000 | |

a Field estimate.

MISCELLANEOUS ANALYSES OF STREAMS IN BRAZOS RIVER BASIN IN TEXAS--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| **811. CROTON CREEK BELOW SHORT CROTON CREEK NEAR JAYTON** | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 20, 1959 | 0.02 | | | | | 5,930 | | | 3,070 | 9,370 | | | | | | | 3,690 | | 78 | | 27,500 | |
| Nov. 8 | .02 | | | | | -- | | | 3,460 | 13,300 | | | | | | | -- | | -- | | 35,300 | |
| Jan. 21, 1960 | .84 | | | | | -- | | | 3,240 | 12,500 | | | | | | | -- | | -- | | 33,700 | |
| Feb. 18 | 1.09 | | | | | 9,470 | | | 3,400 | 14,800 | | | | | | | 4,300 | | 83 | | 38,300 | |
| Mar. 15 | .35 | | | | | 9,890 | | | 3,600 | 15,700 | | | | | | | 4,530 | | 83 | | 40,200 | |
| Apr. 5 | .05 | | | | | -- | | | -- | 21,200 | | | | | | | -- | | -- | | 53,500 | |
| Apr. 15 | .02 | | | | | 13,300 | | | 4,700 | 20,700 | | | | | | | 5,490 | | 84 | | 46,300 | |
| June 15 | .06 | | | | | 10,200 | | | 3,930 | 16,300 | | | | | | | 4,840 | | 82 | | 41,400 | |
| July 26 | .43 | | | | | 3,170 | | | 2,700 | 5,060 | | | | | | | 3,060 | | 69 | | 16,500 | |
| Aug. 17 | 0 | | | | | -- | | | -- | 11,600 | | | | | | | -- | | -- | | 32,600 | |
| Sept. 21 | .05 | | | | | 5,910 | | | 2,710 | 9,400 | | | | | | | 3,110 | | 81 | | 26,100 | |
| **NORTH CROTON CREEK ABOUT 5 MILES UPSTREAM FROM MOUTH NEAR KNOX CITY** | | | | | | | | | | | | | | | | | | | | | | |
| Aug. 16, 1960 | | | | | | 2,320 | | | 1,520 | 3,780 | | | | | | | 1,930 | | 72 | | 12,600 | |
| **822. NORTH CROTON CREEK AT MOUTH NEAR KNOX CITY** | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 26, 1959 | 0 | | | | | -- | | -- | -- | 1,600 | | | | | | | -- | -- | -- | | 6,680 | -- |
| Nov. 17 | 0 | | | | | 641 | | 72 | 1,050 | 1,110 | | | | | | | 1,310 | 1,250 | 52 | | 4,980 | 7.7 |
| Feb. 16, 1960 | .78 | | | | | 4,230 | | -- | 2,190 | 6,940 | | | | | | | 2,980 | -- | 76 | | 20,700 | -- |
| Mar. 14 | .71 | | | | | 3,510 | | -- | 2,400 | 5,960 | | | | | | | 3,260 | -- | 70 | | 18,800 | -- |
| Apr. 18 | 0 | | | | | -- | | -- | -- | 7,090 | | | | | | | -- | -- | -- | | 21,000 | -- |
| May 13 | 0 | | | | | -- | | -- | -- | 8,270 | | | | | | | -- | -- | -- | | 24,200 | -- |
| June 14 | 2.27 | | | | | 904 | | 68 | 1,280 | 1,460 | | | | | | | 1,430 | 1,370 | 58 | | 6,120 | 7.5 |
| July 25 | 1.42 | | | | | 492 | | 92 | 1,100 | 810 | | | | | | | 1,250 | 1,170 | 46 | | 4,190 | 7.6 |
| Aug. 16 | 2.67 | | | | | 372 | 5.5 | 43 | 433 | 600 | | | | | | | 500 | 465 | 61 | | 2,760 | 6.5 |
| Sept. 20 | 0 | | | | | -- | | -- | -- | 3,510 | | | | | | | -- | -- | -- | | 12,400 | -- |
| **824. MUSTANG CREEK AT MOUTH NEAR KNOX CITY** | | | | | | | | | | | | | | | | | | | | | | |
| Nov. 17, 1959 | 0 | | | | | -- | -- | -- | -- | 200 | | | | | | | -- | -- | -- | | 2,060 | -- |
| Dec. 15 | 35.4 | | | | | 19 | 4.0 | 68 | 324 | 22 | | | | | | | 370 | 314 | 10 | | 774 | 7.6 |
| Feb. 12, 1960 | a .02 | | | | | 572 | -- | 126 | 2,260 | 700 | | | | | | | 2,160 | 2,060 | 37 | | 5,350 | 7.7 |
| Mar. 14 | a .10 | | | | | -- | -- | 138 | 2,330 | 760 | | | | | | | 2,110 | 2,000 | -- | | 5,620 | 7.8 |
| Apr. 18 | 0 | | | | | -- | -- | -- | -- | 1,390 | | | | | | | -- | -- | -- | | 8,350 | -- |
| June 14 | a .38 | | | | | 832 | -- | 94 | 1,130 | 1,280 | | | | | | | 1,230 | 1,150 | 60 | | 5,500 | 7.5 |
| July 25 | a .02 | | | | | -- | -- | -- | 2,150 | 1,520 | | | | | | | -- | -- | -- | | 7,250 | -- |
| Aug. 16 | 29.8 | | | | | 25 | 5.2 | 91 | 358 | 30 | | | | | | | 415 | 340 | 11 | | 901 | 7.3 |
| Sept. 20 | a .02 | | | | | 2,520 | -- | -- | 2,910 | 3,680 | | | | | | | 2,890 | -- | 65 | | 13,800 | -- |

a Field estimate.

MISCELLANEOUS ANALYSES OF STREAMS IN BRAZOS RIVER BASIN IN TEXAS--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated): Parts per million | Dissolved solids (calculated): Tons per acre-foot | Dissolved solids (calculated): Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEXICAN CREEK BELOW GYP SPRINGS NEAR SEYMOUR | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 29, 1960 | | 17 | | 640 | 118 | 365 | | 310 | 1,840 | 500 | | 0.0 | | 3,630 | 4.94 | | 2,080 | 1,830 | 28 | 3.5 | 4,290 | 7.3 |
| 840. CLEAR FORK BRAZOS RIVER AT NUGENT | | | | | | | | | | | | | | | | | | | | | | |
| May 17, 1960 | b2.20 | | | | | | | | 1,370 | 880 | | | | | | | | | | | 4,770 | |
| 883. OAK CREEK NEAR GRAHAM | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 22, 1960 | 0 | 2.4 | | 56 | 11 | 35 | | 149 | 63 | 52 | 0.2 | 0.0 | | 293 | 0.40 | | 184 | 62 | 29 | 1.1 | 520 | 7.6 |
| Apr. 25-26 | b28.1 | 8.8 | | 10 | 3.0 | 7.4 | | 40 | 8.8 | 6.0 | .4 | 2.5 | | 67 | .09 | | 37 | 4 | 30 | .5 | 108 | 6.8 |
| May 1-2, 5-7 | b .18 | 12 | | 20 | 3.7 | 6.2 | 6.7 | 70 | 12 | 9.0 | .4 | 2.5 | | 106 | .14 | | 65 | 8 | 15 | .3 | 177 | 7.1 |
| May 30-31 | b23.4 | 6.6 | | 10 | 2.8 | 4.8 | | 37 | 5.6 | 6 | .3 | 1.8 | | 60 | .08 | | 36 | 6 | 22 | .3 | 94 | 6.7 |
| June 1-3 | b .40 | 7.8 | | 20 | 3.5 | 13 | | 65 | 11 | 18 | .3 | 2.2 | | 108 | .15 | | 64 | 11 | 31 | .7 | 201 | 6.6 |
| July 6-8 | b75.3 | 9.4 | | 9.5 | 2.2 | 4.3 | | 34 | 6.8 | 3.0 | .3 | 2.5 | | 55 | .07 | | 33 | 5 | 22 | .3 | 85 | 6.7 |
| July 9-11 | b .63 | 12 | | 19 | 3.4 | 5.1 | 8.1 | 69 | 11 | 8.5 | .2 | 1.8 | | 103 | .14 | | 61 | 5 | 13 | .3 | 160 | 7.0 |
| Aug. 19 | b2.70 | 7.8 | | 7.3 | 1.9 | 1.8 | 6.2 | 32 | 4.4 | 2.2 | .3 | 3.0 | | 51 | .07 | | 26 | 0 | 10 | .2 | 74 | 6.9 |
| LAKE EDDLEMAN NEAR GRAHAM | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 22, 1960 | | 6.4 | 0.16 | 38 | 3.9 | 17 | 5.3 | 113 | 9.2 | 38 | 0.3 | 0.2 | 0.08 | 175 | 0.24 | | 111 | 18 | 24 | 0.7 | 318 | 7.4 |
| LAKE GRAHAM NEAR GRAHAM | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 7, 1959 | | 3.7 | | 48 | 10 | 80 | | 113 | 9.6 | 165 | 0.2 | 0.5 | | c408 | 0.55 | | 161 | 68 | 52 | 2.7 | 724 | 7.3 |
| Nov. 11 | | 5.9 | | 34 | 7.2 | 52 | | 95 | 6.8 | 101 | .2 | .8 | | 255 | .35 | | 114 | 37 | 50 | 2.1 | 493 | 7.2 |
| Dec. 9 | | 6.4 | | 37 | 7.0 | 51 | | 96 | 8.2 | 102 | .2 | 1.0 | | 260 | .35 | | 121 | 42 | 48 | 2.0 | 502 | 6.9 |
| Jan. 13, 1960 | | 4.1 | | 37 | 7.8 | 57 | | 100 | 7.4 | 111 | .4 | .8 | | 274 | .37 | | 124 | 42 | 50 | 2.2 | 528 | 7.5 |
| Mar. 10 | | 3.0 | | 38 | 8.7 | 55 | | 100 | 7.8 | 113 | .1 | .5 | | 275 | .37 | | 131 | 49 | 48 | 2.1 | 550 | 7.4 |
| Mar. 22 | | 6.4 | | 38 | 8.5 | 59 | | 90 | 11 | 122 | .2 | .5 | | 290 | .39 | | 130 | 56 | 50 | 2.2 | 560 | 7.1 |
| Mar. 22 | | 7.4 | | 72 | 18 | 168 | | 106 | 23 | 358 | .2 | 2.2 | | 701 | .95 | | 254 | 166 | 59 | 4.6 | 1,350 | 7.7 |
| Apr. 13 | | 2.6 | | 40 | 8.1 | 57 | | 103 | 7.6 | 116 | .3 | .8 | | 283 | .38 | | 134 | 49 | 48 | 2.1 | 560 | 7.3 |
| May 11 | | .5 | | 41 | 8.7 | 56 | | 108 | 9.2 | 115 | .2 | .2 | | 284 | .39 | | 138 | 50 | 47 | 2.1 | 581 | 7.4 |
| June 15 | | 1.9 | | 44 | 10 | 58 | | 117 | 6.8 | 123 | .3 | .0 | | 302 | .41 | | 151 | 55 | 46 | 2.1 | 620 | 7.4 |
| July 13 | | 2.9 | | 47 | 8.8 | 62 | | 124 | 6.8 | 127 | .2 | .0 | | 316 | .43 | | 154 | 52 | 47 | 2.2 | 620 | 7.5 |
| Aug. 10 | | 4.3 | | 44 | 9.1 | 59 | | 122 | 6.4 | 120 | .3 | .2 | | 303 | .41 | | 148 | 48 | 47 | 2.1 | 582 | 7.0 |
| Sept. 9 | | 4.4 | | 44 | 8.7 | 60 | | 124 | 5.6 | 120 | .3 | .2 | | 304 | .41 | | 146 | 44 | 47 | 2.2 | 593 | 7.3 |
| AQUILLA CREEK AT FM ROAD 1244 NEAR ELM MOTT | | | | | | | | | | | | | | | | | | | | | | |
| Mar. 21, 1960 | | 2.4 | | 165 | 13 | 106 | | 286 | 325 | 82 | 0.6 | 5.5 | | c849 | 1.15 | | 465 | 230 | 33 | 2.1 | 1,230 | 7.7 |

b Mean daily discharge.
c Residue on evaporation at 180°C.

## 1195. COLORADO RIVER NEAR IRA, TEX.

LOCATION.--At gaging station at bridge on State Highway 350, 3 3/4 miles downstream from Bluff Creek, 4 miles upstream from Willow Creek, 4.5 miles southwest of Ira, Scurry County, and at mile 825.
DRAINAGE AREA.--3,617 square miles, approximately, of which 2,590 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: November 1958 to September 1960.
Water temperatures: November 1958 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 67,600 ppm May 1-8; minimum, 592 ppm July 5-6.
Hardness: Maximum, 6,420 ppm May 1-8; minimum, 152 ppm Sept. 23-24.
Specific conductance: Maximum daily, 87,800 micromhos May 8; minimum daily, 869 micromhos July 6.
Water temperatures: Maximum, 95°F July 10; minimum, freezing point Nov. 18, Feb. 24, Mar. 5.
EXTREMES, 1958-60.--Dissolved solids: Maximum, 67,600 ppm May 1-8, 1960; minimum, 255 ppm June 4-6, 1959.
Hardness: Maximum, 6,420 ppm May 1-8, 1960; minimum, 102 ppm June 4-6, 1959.
Specific conductance: Maximum daily, 87,800 micromhos May 8, 1960; minimum daily, 450 micromhos June 5, 1959.
Water temperatures: Maximum, 95°F July 10, 1960; minimum, freezing point Dec. 14, 1958, Nov. 18, 1959, Feb. 24, Mar. 5, 1960.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-2, 1959 | 0.80 | 8.5 | | 581 | 192 | 7,700 | | 74 | 1,510 | 12,300 | | -- | | 22,300 | 30.8 | 48.2 | 2,240 | 2,180 | 88 | 71 | 31,500 | 7.5 |
| Oct. 3-4 | 78.0 | 9.6 | | 61 | 15 | 474 | | 70 | 122 | 750 | | 3.2 | | 1,470 | 2.00 | 310 | 214 | 156 | 83 | 14 | 2,790 | 8.0 |
| Oct. 5-8 | .78 | 7.2 | | 201 | 62 | 2,410 | | 89 | 485 | 3,840 | | -- | | 7,050 | 9.62 | 14.8 | 756 | 684 | 87 | 38 | 11,600 | 7.1 |
| Oct. 9-19 | .10 | 6.4 | | 362 | 131 | 4,690 | | 61 | 921 | 7,540 | | -- | | 13,700 | 18.8 | 3.70 | 1,440 | 1,390 | 88 | 54 | 20,900 | 6.9 |
| Oct. 20-29 | .10 | 4.8 | | 586 | 217 | 7,980 | | 65 | 1,530 | 12,800 | | -- | | 23,200 | 32.0 | 6.26 | 2,350 | 2,300 | 88 | 72 | 32,500 | 6.9 |
| Oct. 30-31 | 10.4 | 6.5 | | 278 | 101 | 3,930 | | 109 | 777 | 6,210 | | -- | | 11,400 | 15.6 | 320 | 1,110 | 1,020 | 89 | 51 | 17,500 | 7.6 |
| Nov. 1-15 | .19 | 4.7 | | 479 | 164 | 7,020 | | 109 | 1,340 | 11,100 | | -- | | 20,200 | 27.8 | 10.4 | 1,870 | 1,780 | 89 | 71 | 29,200 | 7.3 |
| Nov. 16-30 | .15 | 3.6 | | 590 | 193 | 8,880 | | 149 | 1,770 | 13,900 | | -- | | 25,400 | 35.1 | 10.3 | 2,270 | 2,140 | 89 | 81 | 35,600 | 7.3 |
| Dec. 1-14 | .16 | 7.3 | | 658 | 237 | 9,770 | | 154 | 1,940 | 15,400 | | -- | | 28,100 | 38.9 | 12.1 | 2,620 | 2,490 | 89 | 83 | 39,600 | 7.1 |
| Dec. 15-31 | 2.16 | 5.0 | | 475 | 179 | 6,110 | | 140 | 1,490 | 9,600 | | -- | | 17,900 | 24.6 | 104 | 1,920 | 1,810 | 87 | 61 | 26,900 | 7.0 |
| Jan. 1-4, 6-13, 1960 | .92 | 3.0 | | 490 | 182 | 6,600 | | 160 | 1,470 | 10,400 | | -- | | 19,200 | 26.4 | 47.7 | 1,970 | 1,840 | 88 | 65 | 28,600 | 7.4 |
| Jan. 5 | 4.80 | 7.8 | | 230 | 76 | 2,810 | | 92 | 691 | 4,390 | | -- | | 8,250 | 11.2 | 107 | 886 | 811 | 87 | 41 | 13,500 | 7.2 |
| Jan. 14-31 | .45 | 4.0 | | 572 | 225 | 7,680 | | 159 | 1,790 | 12,100 | | -- | | 22,400 | 30.9 | 27.2 | 2,350 | 2,220 | 88 | 69 | 32,500 | 7.2 |
| Feb. 1-10 | .57 | 3.7 | | 567 | 214 | 7,930 | | 165 | 1,830 | 12,400 | | -- | | 23,000 | 31.7 | 35.4 | 2,290 | 2,160 | 88 | 72 | 31,500 | 7.1 |
| Feb. 11-29 | .42 | 3.0 | | 679 | 279 | 9,610 | | 158 | 2,220 | 15,100 | | -- | | 28,000 | 38.7 | 31.8 | 2,840 | 2,710 | 88 | 78 | 36,900 | 7.3 |
| Mar. 1-15 | .44 | 3.9 | | 639 | 252 | 8,950 | | 172 | 2,110 | 14,000 | | -- | | 26,000 | 36.0 | 30.9 | 2,630 | 2,490 | 88 | 76 | 36,300 | 7.4 |
| Mar. 16-31 | .32 | 3.7 | | 782 | 308 | 11,600 | | 103 | 2,670 | 18,100 | | -- | | 33,500 | 46.6 | 28.9 | 3,220 | 3,130 | 89 | 89 | 44,700 | 6.9 |
| Apr. 1-15 | .16 | 4.0 | | 934 | 377 | 14,400 | 42 | 85 | 3,210 | 22,400 | | -- | | 41,400 | 57.9 | 17.9 | 3,880 | 3,810 | 89 | 101 | 52,600 | 6.4 |
| Apr. 16-30 | a .02 | 4.8 | | 1,200 | 500 | 18,400 | | 98 | 4,080 | 28,900 | | -- | | 53,100 | 74.9 | 2.87 | 5,050 | 4,970 | 89 | 113 | 64,000 | 6.4 |
| May 1-8 | 0 | 6.3 | | 1,500 | 650 | 23,400 | | 115 | 5,060 | 36,900 | | -- | | 67,600 | 96.5 | -- | 6,420 | 6,320 | 89 | 127 | 78,900 | 6.8 |
| May 30-31, June 1 | 2.33 | -- | | -- | -- | -- | | 135 | -- | 21,900 | | -- | | -- | -- | -- | 3,850 | 3,740 | -- | -- | 50,800 | 7.6 |
| June 2-5 | .45 | -- | | -- | -- | -- | | 76 | -- | 13,200 | | -- | | -- | -- | -- | 2,340 | 2,280 | -- | -- | 33,200 | 6.6 |
| July 5-6 | 268 | 16 | | 47 | 10 | 159 | | 144 | 58 | 230 | | 1.5 | | 592 | .81 | 428 | 158 | 40 | 69 | 5.5 | 1,040 | 7.8 |
| July 7 | 41.0 | 12 | | 57 | 9.1 | 297 | | 104 | 86 | 460 | | 2.5 | | 975 | 1.33 | 108 | 180 | 94 | 78 | 9.6 | 1,740 | 7.9 |
| July 8-9 | 4.55 | 15 | | 158 | 45 | 1,610 | | 125 | 330 | 2,580 | | -- | | 4,800 | 6.53 | 59.0 | 579 | 476 | 86 | 29 | 8,130 | 7.8 |
| July 10-13 | .68 | -- | | -- | -- | -- | | 95 | -- | 6,210 | | -- | | -- | -- | -- | 1,200 | 1,120 | -- | -- | 17,700 | 7.4 |
| July 14-16 | 4.13 | 13 | | 190 | 60 | 1,990 | | 138 | 436 | 3,180 | | -- | | 5,940 | 8.08 | 66.2 | 720 | 607 | 86 | 32 | 9,920 | 7.9 |
| July 17-18 | .30 | -- | | -- | -- | -- | | 87 | -- | 5,120 | | -- | | -- | -- | -- | 990 | 918 | -- | -- | 15,000 | 7.6 |
| July 19-21 | 3.57 | 14 | | 80 | 22 | 903 | | 116 | 176 | 1,400 | | .8 | | 2,650 | 3.60 | 25.5 | 290 | 195 | 87 | 23 | 4,610 | 7.9 |
| July 22-27 | a .08 | -- | | -- | -- | -- | | 75 | -- | 4,110 | | -- | | -- | -- | -- | 742 | 680 | -- | -- | 12,400 | 7.1 |
| Aug. 9-16 | a .42 | 7.6 | | 377 | 115 | 4,810 | | 51 | 873 | 7,740 | | -- | | 13,900 | 19.1 | 15.8 | 1,410 | 1,370 | 88 | 56 | 21,300 | 6.9 |
| Aug. 24-26 | 0 | 11 | | 93 | 18 | 710 | | 59 | 212 | 1,120 | | 2.0 | | 2,200 | 2.99 | -- | 306 | 258 | 83 | 18 | 3,880 | 7.5 |
| Sept. 23-24 | a .10 | -- | | -- | -- | -- | | 57 | -- | 465 | | -- | | -- | -- | -- | 152 | 106 | -- | -- | 1,770 | 6.9 |
| Weighted average | 2.47 | 13 | | 124 | 40 | 1,320 | | 127 | 310 | 2,060 | | -- | | 3,930 | 5.34 | 26.2 | 474 | 370 | 86 | 26 | 5,900 | -- |

a Includes days of less than 0.05 cubic feet per second discharge.

## 1210. COLORADO RIVER AT COLORADO CITY, TEX.

LOCATION.--At gaging station at Colorado City, Mitchell County, 3,517 feet upstream from bridge on U. S. Highway 80, 4,100 feet upstream from Texas & Pacific Railway Co. bridge, 1.6 miles upstream from Lone Wolf Creek, and at mile 796.
DRAINAGE AREA.--4,082 square miles, approximately, of which 2,590 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: May 1946 to September 1954, November 1956 to September 1960.
Water temperatures: November 1952 to September 1954, November 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 28,500 ppm June 9-13; minimum, 453 ppm July 7.
Hardness: Maximum, 3,490 ppm June 9-13; minimum, 122 ppm July 7.
Specific conductance: Maximum daily, 38,700 micromhos June 12; minimum daily, 728 micromhos July 7.
Water temperatures: Maximum, 98°F July 29; minimum, freezing point Mar. 1, 3-4.
EXTREMES, 1946-54, 1956-60.--Dissolved solids: Maximum, 32,800 ppm Apr. 1-10, 1952; minimum, 176 ppm Oct. 26, 1947.
Hardness: Maximum, 4,500 ppm Aug. 9-12, 1946; minimum, 65 ppm Sept. 15-20, 1949.
Specific conductance: Maximum daily, 45,800 micromhos Apr. 1-10, 1952; minimum daily, 245 micromhos May 14, 1957.
Water temperatures (1956-60): Maximum, 98°F July 29, 1960; minimum, freezing point on several days during December, January, and March.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH | Density at 20°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | | |
| Oct. 1, 3, 5-6, 1959--- | 134 | 11 | | 54 | 12 | 247 | 6.2 | 117 | 97 | 378 | | 2.2 | a868 | 1.18 | 314 | 184 | 88 | 74 | 7.9 | 1,570 | 7.2 | -- |
| Oct. 2, 4, 7-10-------- | 42.0 | 7.8 | | 101 | 30 | 875 | | 99 | 239 | 1,380 | | 2.5 | 2,680 | 3.64 | 304 | 376 | 294 | 84 | 20 | 4,760 | 7.0 | -- |
| Oct. 11-27------------- | b .68 | 4.2 | | 195 | 72 | 2,120 | | 67 | 520 | 3,400 | | -- | 6,340 | 8.62 | 11.6 | 782 | 728 | 85 | 33 | 10,700 | 6.8 | -- |
| Oct. 28-31, Nov. 1-3--- | b32.9 | 6.6 | | 102 | 29 | 864 | | 78 | 219 | 1,390 | | .5 | 2,650 | 3.60 | 235 | 374 | 310 | 83 | 19 | 4,730 | 7.2 | -- |
| Nov. 4-12-------------- | 3.49 | 5.2 | | 146 | 52 | 1,400 | | 90 | 378 | 2,230 | | -- | 4,260 | 5.79 | 40.1 | 578 | 504 | 84 | 25 | 7,320 | 7.3 | -- |
| Nov. 13-20------------- | 1.46 | 4.8 | | 232 | 72 | 2,160 | | 115 | 578 | 3,460 | | -- | 6,560 | 8.95 | 25.9 | 875 | 781 | 84 | 32 | 11,100 | 6.9 | 1.003 |
| Nov. 21-30------------- | .99 | 3.8 | | 301 | 117 | 3,250 | | 116 | 830 | 5,200 | | -- | 9,760 | 13.3 | 26.1 | 1,230 | 1,140 | 85 | 40 | 15,900 | 6.9 | 1.005 |
| Dec. 1-4--------------- | .98 | 4.0 | | 328 | 130 | 3,660 | | 128 | 904 | 5,860 | | -- | 10,900 | 14.9 | 28.8 | 1,350 | 1,250 | 85 | 43 | 17,600 | 7.0 | 1.006 |
| Dec. 5-14-------------- | 1.23 | 4.0 | | 365 | 149 | 4,170 | | 128 | 996 | 6,700 | | -- | 12,400 | 17.0 | 41.2 | 1,520 | 1,420 | 86 | 47 | 19,800 | 7.4 | 1.008 |
| Dec. 15-31------------- | 9.84 | 6.4 | | 271 | 108 | 2,800 | | 148 | 729 | 4,480 | | -- | 8,470 | 11.6 | 225 | 1,120 | 998 | 84 | 36 | 13,900 | 7.3 | 1.005 |
| Jan. 1-15, 1960-------- | 6.17 | 3.8 | | 323 | 132 | 3,350 | | 164 | 888 | 5,370 | | -- | 10,100 | 13.8 | 168 | 1,350 | 1,210 | 84 | 40 | 16,000 | 7.5 | 1.006 |
| Jan. 16-31------------- | 3.26 | 3.8 | | 355 | 148 | 3,710 | | 184 | 1,030 | 5,910 | | -- | 11,200 | 15.3 | 98.6 | 1,490 | 1,340 | 84 | 42 | 17,500 | 7.4 | 1.007 |
| Feb. 1-29-------------- | 2.34 | 4.6 | | 436 | 181 | 4,760 | | 174 | 1,220 | 7,630 | | -- | 14,300 | 19.6 | 90.3 | 1,830 | 1,690 | 85 | 49 | 20,800 | 6.9 | 1.009 |
| Mar. 1-15-------------- | 2.41 | 4.0 | | 466 | 192 | 4,930 | | 164 | 1,290 | 7,930 | | -- | 14,900 | 20.4 | 97.0 | 1,950 | 1,820 | 85 | 49 | 22,400 | 7.3 | 1.009 |
| Mar. 16-31------------- | 1.09 | 3.8 | | 495 | 208 | 5,310 | | 135 | 1,480 | 8,810 | | -- | 16,600 | 22.8 | 48.9 | 2,090 | 1,980 | 85 | 52 | 24,600 | 7.0 | 1.010 |
| Apr. 1-13-------------- | .31 | 4.5 | | 587 | 254 | 6,950 | 55 | 106 | 1,840 | 11,100 | | -- | 20,800 | 28.7 | 17.4 | 2,510 | 2,420 | 85 | 60 | 29,000 | 7.0 | 1.014 |
| Apr. 14-26------------- | b .02 | -- | | -- | -- | -- | | 83 | -- | 12,700 | | -- | -- | -- | -- | 2,970 | 2,900 | -- | -- | 32,700 | 6.6 | 1.016 |
| Apr. 27-30------------- | b .58 | 6.2 | | 245 | 91 | 2,130 | | 92 | 644 | 3,450 | | -- | 6,610 | 8.99 | 10.4 | 986 | 910 | 82 | 29 | 10,800 | 6.7 | -- |
| May 1-3---------------- | 0 | -- | | -- | -- | -- | | 132 | -- | 5,370 | | -- | -- | -- | -- | 1,510 | 1,400 | -- | -- | 16,100 | 6.9 | 1.005 |
| May 4-10--------------- | 0 | -- | | -- | -- | -- | | 132 | -- | 10,600 | | -- | -- | -- | -- | 2,590 | 2,480 | -- | -- | 28,400 | 6.6 | 1.013 |
| May 11-21-------------- | 0 | -- | | -- | -- | -- | | 86 | -- | 5,910 | | -- | -- | -- | -- | 1,460 | 1,390 | -- | -- | 17,500 | 6.5 | 1.006 |
| May 29----------------- | 0 | -- | | -- | -- | -- | | 55 | -- | 9,980 | | -- | -- | -- | -- | 2,690 | 2,640 | -- | -- | 27,700 | 7.1 | 1.012 |
| May 30----------------- | .20 | -- | | -- | -- | -- | | 94 | -- | 2,880 | | -- | -- | -- | -- | 820 | 743 | -- | -- | 9,270 | 6.2 | -- |
| May 31----------------- | .10 | -- | | -- | -- | -- | | 96 | -- | 3,710 | | -- | -- | -- | -- | 1,020 | 942 | -- | -- | 11,700 | 7.7 | 1.003 |
| June 1-7--------------- | 0 | -- | | -- | -- | -- | | 117 | -- | 7,940 | | -- | -- | -- | -- | 2,020 | 1,920 | -- | -- | 22,100 | 7.4 | 1.008 |
| June 8----------------- | 8.60 | 13 | | 156 | 57 | 1,280 | | 140 | 375 | 2,050 | | -- | 4,000 | 5.44 | 92.9 | 624 | 509 | 82 | 22 | 6,830 | 7.3 | -- |
| June 9-13-------------- | 2.50 | 6.7 | | 874 | 318 | 9,530 | | 77 | 2,470 | 15,300 | | -- | 28,500 | 39.5 | 192 | 3,490 | 3,420 | 86 | 70 | 38,300 | 7.0 | 1.018 |
| July 5-6, 8------------ | 185 | 14 | | 82 | 16 | 470 | | 97 | 160 | 740 | | 3.0 | 1,530 | 2.08 | 764 | 270 | 191 | 79 | 12 | 2,670 | 7.1 | -- |
| July 7----------------- | 1,700 | 10 | | 40 | 5.2 | 121 | | 102 | 45 | 178 | | 3.8 | 453 | .62 | 2,080 | 122 | 38 | 68 | 4.8 | 728 | 7.9 | -- |
| July 9-20-------------- | 15.9 | 12 | | 180 | 60 | 1,590 | | 100 | 378 | 2,600 | | -- | 4,870 | 6.62 | 209 | 696 | 614 | 83 | 26 | 8,220 | 7.4 | -- |
| July 21-31------------- | 1.65 | -- | | -- | -- | -- | | 62 | -- | 4,180 | | -- | -- | -- | -- | 941 | 890 | -- | -- | 12,700 | 7.1 | 1.004 |
| Aug. 1-13-------------- | b .22 | -- | | -- | -- | -- | | 64 | -- | 6,360 | | -- | -- | -- | -- | 1,410 | 1,360 | -- | -- | 17,000 | 6.5 | 1.006 |
| Aug. 14-18------------- | .82 | -- | | -- | -- | -- | | 51 | -- | 9,700 | | -- | -- | -- | -- | 2,200 | 2,160 | -- | -- | 25,500 | 6.8 | 1.010 |
| Aug. 19-20------------- | 71.0 | 12 | | 44 | 11 | 237 | | 76 | 76 | 405 | | 1.5 | 844 | 1.15 | 162 | 155 | 92 | 78 | 9.0 | 1,600 | 7.5 | -- |
| Aug. 21----------------- | 4.60 | -- | | -- | -- | -- | | 66 | -- | 1,090 | | -- | -- | -- | -- | 294 | 240 | -- | -- | 3,680 | 7.6 | -- |
| Aug. 22-31------------- | 12.5 | 7.4 | | 130 | 40 | 1,340 | | 50 | 316 | 2,150 | | -- | 4,010 | 5.45 | 135 | 489 | 448 | 86 | 26 | 6,770 | 6.6 | -- |
| Sept. 1-2-------------- | .25 | 10 | | 175 | 58 | 1,990 | | 67 | 394 | 3,220 | | -- | 5,880 | 8.00 | 3.97 | 675 | 620 | 87 | 33 | 9,820 | 7.5 | -- |
| Sept. 3-11------------- | 0 | -- | | -- | -- | -- | | 43 | -- | 4,060 | | -- | -- | -- | -- | 837 | 802 | -- | -- | 12,200 | 6.7 | 1.003 |
| Sept. 12-14------------ | 2.30 | 10 | | 291 | 121 | 3,510 | | 64 | 844 | 5,620 | | -- | 10,400 | 14.2 | 64.6 | 1,220 | 1,170 | 86 | 44 | 16,500 | 7.3 | 1.005 |
| Sept. 15-30------------ | b .06 | -- | | -- | -- | -- | | 57 | -- | 6,800 | | -- | -- | -- | -- | 1,500 | 1,450 | -- | -- | 19,400 | 6.6 | 1.007 |
| Weighted average----- | c11.8 | 9.8 | | 102 | 31 | 828 | | 105 | 228 | 1,320 | | -- | 2,570 | 3.50 | 81.9 | 382 | 296 | 83 | 18 | 4,190 | -- | -- |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.
c Represents 100 percent of flow for water year October 1959 to September 1960.
Note: Values given in this table are expressed in parts per million and should be multiplied by the density, where given, in any computation of loads.

## 1238. BEALS CREEK NEAR WESTBROOK, TEX.

LOCATION.--At gaging station at bridge on State Highway 163, 1.5 miles downstream from Crystal Creek, 11 miles south of Westbrook, Mitchell County, and 12 miles upstream from mouth.
DRAINAGE AREA.--10,800 square miles, approximately, of which 7,045 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: November 1958 to September 1960.
Water temperatures: November 1958 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 14,900 ppm May 5-21; minimum, 155 ppm Nov. 4.
Hardness: Maximum, 5,010 ppm May 5-21; minimum, 93 ppm Oct. 2-3.
Specific conductance: Maximum daily, 21,600 micromhos May 16; minimum daily, 242 micromhos Oct. 3.
Water temperatures: Maximum, 98°F July 28; minimum, 34°F Jan. 19.
EXTREMES, 1958-60.--Dissolved solids: Maximum, 14,900 ppm May 5-21, 1960; minimum, 155 ppm Nov. 4, 1959.
Hardness: Maximum, 5,010 ppm May 5-21, 1960; minimum, 84 ppm July 2, 12, 1959.
Specific conductance: Maximum daily, 21,600 micromhos May 16, 1960; minimum daily, 242 micromhos Oct. 3, 1959.
Water temperatures: Maximum, 98°F July 28, 1960; minimum, 33°F Dec. 30-31, 1958, Jan. 21, 1959.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as CaCO3: Calcium, magnesium | Hardness as CaCO3: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1, 4-5, 1959 | 619 | 10 | | 42 | 11 | 52 | 5.6 | 130 | 54 | 76 | -- | 2.2 | | 328 | 0.45 | 548 | 150 | 44 | 42 | 1.8 | 565 | 7.6 |
| Oct. 2-3 | 2,530 | 10 | | 28 | 5.7 | 27 | | 105 | 19 | 32 | -- | 1.8 | | 185 | .25 | 1,260 | 93 | 7 | 39 | 1.2 | 312 | 7.7 |
| Oct. 6-18 | a5.25 | 9.9 | | 78 | 36 | 208 | | 127 | 213 | 332 | -- | 1.8 | | 968 | 1.32 | 13.7 | 342 | 238 | 57 | 4.9 | 1,600 | 7.5 |
| Oct. 30-31 | 624 | 11 | | 39 | 9.1 | 70 | | 106 | 39 | 112 | -- | 2.2 | | 338 | .46 | 569 | 135 | 48 | 53 | 2.6 | 606 | 7.0 |
| Nov. 1-3, 5-7 | 13.6 | 10 | | 37 | 9.4 | 62 | | 100 | 51 | 91 | -- | 2.0 | | 316 | .43 | 11.6 | 131 | 49 | 51 | 2.4 | 559 | 7.1 |
| Nov. 4 | 19.0 | -- | | -- | -- | -- | | 106 | -- | 16 | -- | -- | | 155 | .21 | 7.95 | 95 | 8 | -- | -- | 258 | 7.9 |
| Nov. 8-21 | .74 | 9.5 | | 74 | 27 | 178 | | 144 | 166 | 278 | -- | .8 | | 821 | 1.12 | 1.64 | 296 | 178 | 57 | 4.5 | 1,410 | 7.2 |
| Nov. 22-30 | .27 | 4.4 | | 104 | 44 | 276 | | 177 | 258 | 445 | -- | .5 | | 1,220 | 1.66 | .89 | 440 | 296 | 58 | 5.7 | 2,120 | 7.6 |
| Dec. 1-15 | .51 | 5.3 | | 120 | 61 | 359 | | 204 | 342 | 570 | -- | 4.4 | | 1,560 | 2.12 | 2.15 | 550 | 384 | 59 | 6.6 | 2,690 | 7.8 |
| Dec. 16-17 | 56.1 | 6.2 | | 147 | 156 | 753 | | 160 | 754 | 1,220 | -- | 12 | | 3,130 | 4.26 | 474 | 1,010 | 878 | 62 | 10 | 5,050 | 7.8 |
| Dec. 18-26 | 6.87 | 9.8 | | 56 | 31 | 197 | | 114 | 158 | 305 | -- | 8.7 | | 868 | 1.18 | 16.1 | 267 | 174 | 62 | 5.2 | 1,480 | 7.8 |
| Dec. 27-31 | 1.20 | 10 | | 130 | 99 | 521 | | 197 | 514 | 820 | -- | 15 | | 2,210 | 3.01 | 7.16 | 732 | 570 | 61 | 8.4 | 3,640 | 7.5 |
| Jan. 1-4, 7-9, 1960 | 3.97 | 10 | | 186 | 227 | 1,030 | | 245 | 988 | 1,690 | -- | 24 | | 4,280 | 5.82 | 45.9 | 1,400 | 1,200 | 62 | 12 | 6,830 | 7.5 |
| Jan. 5-6 | 7.65 | 6.6 | | 124 | 150 | 755 | | 154 | 728 | 1,190 | -- | 6.5 | | 3,040 | 4.13 | 62.8 | 926 | 800 | 64 | 11 | 4,720 | 7.6 |
| Jan. 10-11 | 1.80 | -- | | -- | -- | -- | | 268 | -- | 1,610 | -- | -- | | -- | -- | -- | 1,320 | 1,100 | -- | -- | 6,490 | 7.8 |
| Jan. 12-15 | 2.32 | 7.0 | | 96 | 89 | 486 | | 188 | 454 | 730 | -- | 6.0 | | 1,960 | 2.67 | 12.3 | 606 | 452 | 64 | 8.6 | 3,210 | 7.3 |
| Jan. 16-31 | 1.13 | 8.2 | | 172 | 227 | 1,010 | | 239 | 1,020 | 1,620 | -- | 10 | | 4,190 | 5.70 | 12.8 | 1,360 | 1,170 | 62 | 12 | 6,470 | 7.3 |
| Feb. 1-14 | 1.17 | 4.6 | | 180 | 313 | 1,340 | | 188 | 1,370 | 2,180 | -- | -- | | 5,480 | 7.45 | 17.3 | 1,740 | 1,580 | 63 | 14 | 8,230 | 7.8 |
| Feb. 15-29 | .90 | 3.8 | | 180 | 324 | 1,410 | | 177 | 1,430 | 2,280 | -- | -- | | 5,710 | 7.77 | 13.9 | 1,780 | 1,640 | 63 | 15 | 8,530 | 7.6 |
| Mar. 1-12 | 1.34 | 6.2 | | 185 | 306 | 1,460 | | 240 | 1,420 | 2,280 | -- | -- | | 5,780 | 7.86 | 20.9 | 1,720 | 1,520 | 65 | 15 | 8,740 | 7.4 |
| Mar. 13-31 | .82 | 10 | | 185 | 276 | 1,400 | | 246 | 1,350 | 2,150 | -- | -- | | 5,490 | 7.47 | 12.2 | 1,600 | 1,400 | 66 | 15 | 8,310 | 7.3 |
| Apr. 1-20 | a .40 | 11 | | 215 | 302 | 1,470 | 35 | 291 | 1,440 | 2,320 | 1.7 | -- | | 5,940 | 8.08 | 6.42 | 1,780 | 1,540 | 64 | 15 | 8,840 | 7.9 |
| Apr. 27-28 | 690 | 6.2 | | 42 | 15 | 91 | | 114 | 93 | 122 | .6 | .5 | | 442 | .60 | 823 | 166 | 73 | 54 | 3.1 | 757 | 7.5 |
| Apr. 29 (12 p.m.-12 m.) | 400 | 9.4 | | 28 | 6.6 | 31 | | 103 | 27 | 35 | .4 | .8 | | b189 | .26 | 204 | 97 | 13 | 41 | 1.4 | 323 | 7.6 |
| Apr. 29 (12 m.-12 p.m.) | 130 | -- | | -- | -- | -- | | 101 | -- | 650 | -- | -- | | -- | -- | -- | 320 | 237 | -- | -- | 2,230 | 7.5 |
| Apr. 30 | 23.0 | 10 | | 63 | 18 | 170 | | 110 | 102 | 282 | .4 | 7.1 | | b706 | .96 | 43.8 | 231 | 141 | 62 | 4.9 | 1,270 | 7.9 |
| May 1-2 | 16.5 | -- | | -- | -- | -- | | 138 | -- | 380 | -- | -- | | -- | -- | -- | 396 | 283 | -- | -- | 1,870 | 7.9 |
| May 3 (12 p.m.-3 p.m.) | 22.4 | -- | | -- | -- | -- | | 192 | -- | 860 | -- | -- | | -- | -- | -- | 790 | 632 | -- | -- | 3,770 | 8.0 |
| May 3 (3 p.m.-12 p.m.) | 16.0 | -- | | -- | -- | -- | | 129 | -- | 310 | -- | -- | | -- | -- | -- | 314 | 208 | -- | -- | 1,540 | 7.9 |
| May 4 | 19.0 | -- | | -- | -- | -- | | 236 | -- | 1,280 | -- | -- | | -- | -- | -- | 1,110 | 916 | -- | -- | 5,250 | 7.6 |
| May 5-21 | a5.02 | 6.9 | | 395 | 978 | 3,520 | | 231 | 3,810 | 6,030 | 1.3 | -- | | 14,900 | 20.5 | 202 | 5,010 | 4,820 | 60 | 22 | 20,200 | 7.4 |
| May 30-31 | 36.5 | 5.4 | | 52 | 33 | 218 | | 89 | 163 | 348 | .6 | 5.2 | | 902 | 1.23 | 88.9 | 265 | 192 | 64 | 5.8 | 1,570 | 7.3 |
| June 1-7 | 2.69 | 7.0 | | 82 | 60 | 431 | | 91 | 326 | 690 | -- | 2.0 | | 1,640 | 2.23 | 11.9 | 451 | 376 | 68 | 8.8 | 2,820 | 7.5 |

a Includes days of less than 0.05 cubic feet per second discharge.
b Calculated from determined constituents.

1238. BEALS CREEK NEAR WESTBROOK, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| July 5, 7 (12 p.m.-12 m.), 1960 | 213 | 12 | | 48 | 17 | 117 | | 141 | 102 | 157 | -- | 1.0 | | 535 | 0.73 | 308 | 190 | 74 | 57 | 3.7 | 918 | 7.6 |
| July 6 | 691 | 10 | | 32 | 9.6 | 49 | | 133 | 38 | 54 | -- | .5 | | b258 | .35 | 481 | 119 | 10 | 47 | 2.0 | 455 | 7.6 |
| July 7 (12 m.-12 p.m.) | 84.0 | -- | | -- | -- | -- | | 130 | -- | 345 | -- | -- | | -- | -- | -- | 358 | 252 | -- | -- | 1,710 | 7.8 |
| July 8-9 | 70.0 | 14 | | 91 | 61 | 314 | | 128 | 320 | 510 | -- | 4.9 | | 1,380 | 1.88 | 261 | 478 | 373 | 59 | 6.2 | 2,330 | 7.4 |
| July 10-14 | 39.6 | 10 | | 175 | 280 | 1,140 | | 122 | 1,240 | 1,900 | -- | 4.5 | | 4,810 | 6.54 | 514 | 1,590 | 1,490 | 61 | 12 | 7,470 | 6.8 |
| July 15-20 | 31.3 | 11 | | 46 | 20 | 169 | | 94 | 120 | 255 | -- | 3.0 | | 715 | .97 | 60.4 | 197 | 120 | 65 | 5.2 | 1,220 | 7.4 |
| July 21-22, 25-26 | 5.75 | 9.4 | | 33 | 11 | 88 | | 77 | 59 | 137 | -- | 2.0 | | 396 | .54 | 6.15 | 128 | 64 | 60 | 3.4 | 669 | 7.6 |
| July 23-24, 27-29 | .56 | 8.2 | | 49 | 20 | 160 | | 80 | 112 | 262 | -- | .5 | | 712 | .97 | 1.08 | 204 | 139 | 63 | 4.9 | 1,200 | 7.3 |
| Aug. 26 | 28.0 | 12 | | 109 | 87 | 536 | | 268 | 492 | 740 | 1.3 | 19 | | 2,130 | 2.90 | 161 | 630 | 410 | 65 | 9.3 | 3,420 | 7.9 |
| Aug. 27 | 7.70 | 10 | | 40 | 24 | 143 | | 104 | 136 | 196 | .8 | 5.7 | | b606 | .82 | 12.6 | 198 | 114 | 61 | 4.4 | 1,050 | 7.5 |
| Aug. 28-29 | .90 | 11 | | 24 | 13 | 80 | | 103 | 67 | 91 | .7 | 3.2 | | b341 | .46 | .83 | 114 | 29 | 60 | 3.3 | 587 | 7.7 |
| Sept. 9-14 | a14.3 | 8.8 | | 34 | 12 | 132 | | 91 | 34 | 220 | -- | 3.2 | | 527 | .72 | 20.3 | 134 | 60 | 68 | 5.0 | 935 | 6.8 |
| Weighted average | c33.7 | 9.6 | | 44 | 26 | 125 | | 116 | 117 | 193 | -- | 2.1 | | 585 | 0.80 | 53.2 | 217 | 122 | 56 | 3.7 | 942 | -- |

a Includes days of less than 0.05 cubic feet per second discharge.
b Calculated from determined constituents.
c Represents 100 percent of runoff for water year October 1959 to September 1960.

## 1239. COLORADO RIVER NEAR SILVER, TEX.

LOCATION.--At gaging station at bridge on FM Road 2059, 5.4 miles southwest of Silver, Coke County, 11 miles upstream from Pecan Creek, 16.4 miles northwest of Robert Lee, and at mile 743.
DRAINAGE AREA.--15,480 square miles, approximately, of which 11,600 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1960.
Water temperatures: October 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 11,100 ppm Apr. 15-25; minimum, 253 ppm Aug. 20.
Hardness: Maximum, 2,870 ppm June 1-8; minimum, 127 ppm Oct. 3.
Specific conductance: Maximum daily, 17,500 micromhos Apr. 22, 25; minimum daily, 376 micromhos Oct. 3 at 11 a.m.
Water temperatures: Maximum, 93°F July 23, 29; minimum, 33°F Mar. 5.
EXTREMES, 1956-60.--Dissolved solids: Maximum, 12,800 ppm Apr. 21-30, 1959; minimum, 180 ppm June 1-4, 1957.
Hardness: Maximum, 2,870 ppm June 1-8, 1960; minimum, 93 ppm Apr. 29-30, 1957.
Specific conductance: Maximum daily, 20,300 micromhos May 1, 1959; minimum daily, 202 micromhos June 2, 1957.
Water temperatures: Maximum, 93°F July 23, 29, 1960; minimum, freezing point Dec. 15, 1958, Feb. 1-3, 5, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1, 1959 | 28.0 | -- | | -- | -- | 85 | 4.8 | 60 | -- | 1,160 | -- | -- | | -- | -- | -- | 975 | 926 | -- | -- | 4,840 | 7.4 |
| Oct. 2 | 1,290 | 10 | | 45 | 10 | | | 128 | 73 | 116 | -- | 4.0 | | 411 | 0.56 | 1,430 | 154 | 48 | 54 | 3.0 | 719 | 7.7 |
| Oct. 3 | 2,720 | 9.6 | | 40 | 6.7 | | 40 | 132 | 38 | 45 | -- | 3.2 | | a260 | .35 | 1,910 | 127 | 19 | 40 | 1.5 | 428 | 7.7 |
| Oct. 4 | 3,540 | 11 | | 44 | 8.4 | | 129 | 113 | 53 | 195 | -- | 2.5 | | a512 | .70 | 4,890 | 144 | 52 | 66 | 4.7 | 919 | 7.6 |
| Oct. 5 | 741 | 15 | | 43 | 8.6 | | 117 | 111 | 60 | 171 | -- | 2.2 | | 472 | .64 | 944 | 143 | 52 | 64 | 4.3 | 842 | 8.0 |
| Oct. 6 | 252 | 13 | | 69 | 15 | | 265 | 130 | 125 | 405 | -- | 2.8 | | 959 | 1.30 | 653 | 234 | 127 | 71 | 7.5 | 1,710 | 7.9 |
| Oct. 7-16 | 27.4 | 10 | | 89 | 23 | | 441 | 112 | 221 | 675 | -- | 2.5 | | 1,520 | 2.07 | 112 | 316 | 224 | 75 | 11 | 2,660 | 8.1 |
| Oct. 17-23 | 3.49 | 11 | | 137 | 33 | | 609 | 141 | 359 | 930 | -- | 2.0 | | 2,150 | 2.92 | 20.3 | 478 | 362 | 74 | 12 | 3,640 | 7.9 |
| Oct. 24-30 | 60.5 | 11 | | 192 | 43 | | 961 | 162 | 518 | 1,470 | -- | .5 | | 3,280 | 4.46 | 536 | 656 | 523 | 76 | 16 | 5,400 | 7.7 |
| Oct. 31 | 1,140 | 15 | | 40 | 9.2 | | 99 | 113 | 49 | 148 | -- | 2.5 | | 419 | .57 | 1,290 | 138 | 46 | 61 | 3.7 | 743 | 8.2 |
| Nov. 1 | 200 | 12 | | 54 | 11 | | 210 | 108 | 90 | 320 | -- | 3.0 | | 753 | 1.02 | 407 | 180 | 91 | 72 | 6.8 | 1,370 | 8.2 |
| Nov. 2-17 | 23.8 | 7.4 | | 94 | 25 | | 474 | 108 | 225 | 740 | -- | 1.0 | | 1,620 | 2.20 | 104 | 338 | 249 | 75 | 11 | 2,890 | 7.4 |
| Nov. 18-30 | 2.31 | 9.4 | | 192 | 43 | | 684 | 149 | 492 | 1,070 | -- | .8 | | 2,560 | 3.48 | 16.0 | 656 | 534 | 69 | 12 | 4,290 | 7.3 |
| Dec. 1-16 | 1.72 | 9.6 | | 260 | 58 | | 955 | 171 | 680 | 1,500 | -- | .5 | | 3,550 | 4.83 | 16.5 | 887 | 747 | 70 | 14 | 5,830 | 7.5 |
| Dec. 17-20 | 62.0 | 8.8 | | 142 | 42 | | 412 | 128 | 398 | 640 | -- | 1.2 | | 1,710 | 2.33 | 286 | 528 | 423 | 63 | 7.8 | 2,860 | 7.7 |
| Dec. 21-31 | 13.2 | 6.2 | | 230 | 75 | | 1,580 | 131 | 552 | 2,580 | -- | -- | | 5,090 | 6.92 | 181 | 882 | 775 | 80 | 23 | 8,300 | 7.5 |
| Jan. 1-21, 1960 | 9.29 | 4.4 | | 248 | 76 | | 1,380 | 154 | 656 | 2,220 | -- | -- | | 4,660 | 6.34 | 117 | 932 | 806 | 76 | 20 | 7,770 | 7.4 |
| Jan. 22-31, Feb. 1-5 | 4.60 | 5.2 | | 288 | 91 | | 1,550 | 162 | 780 | 2,500 | -- | -- | | 5,290 | 7.19 | 65.7 | 1,090 | 960 | 76 | 20 | 8,550 | 7.6 |
| Feb. 6-8 | 5.20 | 5.2 | | 210 | 62 | | 986 | 124 | 556 | 1,590 | -- | .8 | | 3,470 | 4.72 | 48.7 | 779 | 678 | 73 | 15 | 5,780 | 7.5 |
| Feb. 9-21 | 3.64 | 4.2 | | 355 | 109 | | 1,790 | 164 | 992 | 2,880 | -- | -- | | 6,210 | 8.45 | 61.0 | 1,330 | 1,200 | 74 | 21 | 9,760 | 7.2 |
| Feb. 22-29 | 3.10 | 5.6 | | 390 | 131 | | 1,820 | 124 | 1,090 | 3,000 | -- | -- | | 6,500 | 8.84 | 54.4 | 1,510 | 1,410 | 72 | 20 | 10,200 | 7.5 |
| Mar. 1-15 | 4.03 | 5.6 | | 380 | 122 | | 1,780 | 120 | 1,090 | 2,900 | -- | -- | | 6,340 | 8.62 | 69.0 | 1,450 | 1,350 | 73 | 20 | 9,800 | 7.6 |
| Mar. 16-31 | 1.68 | 3.2 | | 443 | 142 | | 2,240 | 132 | 1,270 | 3,640 | -- | -- | | 7,800 | 10.7 | 35.4 | 1,690 | 1,580 | 74 | 24 | 11,900 | 7.5 |
| Apr. 1-14 | .59 | 3.5 | | 502 | 151 | | 2,740 | 117 | 1,480 | 4,400 | -- | -- | | 9,330 | 12.8 | 14.9 | 1,870 | 1,780 | 76 | 28 | 14,000 | 7.5 |
| Apr. 15-25 | .11 | 4.3 | | 572 | 165 | | 3,300 | 109 | 1,740 | 5,240 | -- | -- | | 11,100 | 15.2 | 3.30 | 2,110 | 2,020 | 77 | 31 | 16,200 | 7.3 |
| Apr. 26-27 | 11.3 | 15 | | 78 | 19 | | 262 | 69 | 179 | 420 | 0.4 | 7.4 | | 1,010 | 1.37 | 30.8 | 272 | 216 | 68 | 6.9 | 1,840 | 7.3 |
| Apr. 28-30 | 446 | 18 | | 58 | 18 | | 110 | 128 | 115 | 159 | .5 | 9.2 | | a591 | .80 | 712 | 218 | 114 | 52 | 3.2 | 954 | 7.6 |
| May 1-2 | 30.5 | 22 | | 56 | 12 | | 124 | 117 | 105 | 175 | -- | 6.7 | | 559 | .76 | 46.0 | 189 | 93 | 59 | 3.9 | 968 | 7.9 |
| May 3-4, 11 | 11.9 | 19 | | 82 | 21 | | 205 | 108 | 151 | 345 | -- | 6.1 | | 882 | 1.20 | 28.3 | 291 | 202 | 61 | 5.2 | 1,570 | 7.6 |
| May 5-10 | 10.3 | 14 | | 126 | 35 | | 434 | 78 | 225 | 780 | -- | 4.0 | | 1,660 | 2.26 | 46.2 | 458 | 394 | 67 | 8.8 | 2,950 | 7.2 |
| May 12-31 | b2.03 | 8.2 | | 225 | 66 | | 1,040 | 95 | 642 | 1,670 | -- | 4.0 | | 3,700 | 5.03 | 20.3 | 833 | 755 | 73 | 16 | 6,120 | 7.3 |
| June 1-8 | 10.1 | 7.5 | | 333 | 497 | | 2,290 | 135 | 2,380 | 3,730 | -- | -- | | 9,300 | 12.7 | 254 | 2,870 | 2,760 | 63 | 19 | 13,300 | 7.4 |
| June 9-10 | 99.0 | 16 | | 47 | 11 | | 44 | 136 | 57 | 58 | -- | 6.2 | | 306 | .42 | 81.8 | 162 | 51 | 37 | 1.5 | 526 | 8.0 |
| June 11-12 | 2.80 | 13 | | 50 | 14 | | 102 | 98 | 106 | 150 | -- | 3.2 | | 486 | .66 | 3.67 | 182 | 102 | 55 | 3.3 | 849 | 7.8 |
| June 13-17 | b .12 | 9.4 | | 78 | 25 | | 253 | 98 | 204 | 390 | -- | 5.1 | | 1,010 | 1.37 | .33 | 298 | 217 | 65 | 6.4 | 1,770 | 7.3 |
| June 18-25 | 0 | -- | | -- | -- | | -- | 103 | -- | 800 | -- | -- | | -- | -- | -- | 545 | 460 | -- | -- | 3,390 | 7.2 |
| June 26-30 | 0 | -- | | -- | -- | | -- | 100 | -- | 1,420 | -- | -- | | -- | -- | -- | 765 | 683 | -- | -- | 5,490 | 7.1 |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.

1239. COLORADO RIVER NEAR SILVER, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| July 1-5, 1960 | 0 | -- | | -- | -- | -- | | 90 | -- | 1,740 | -- | -- | | -- | -- | -- | 905 | 831 | -- | -- | 6,470 | 7.4 |
| July 6 | 340 | 13 | | 58 | 23 | 164 | | 157 | 154 | 215 | -- | 3.0 | | 707 | 0.96 | 649 | 239 | 110 | 60 | 4.6 | 1,230 | 7.5 |
| July 7 (12 p.m.-12 m.) | 600 | 14 | | 44 | 15 | 105 | | 132 | 92 | 137 | -- | 4.5 | | 476 | .65 | 771 | 172 | 64 | 57 | 3.5 | 835 | 7.9 |
| July 7 (12 m.-12 p.m.) | 880 | 19 | | 230 | 66 | 1,640 | | 135 | 544 | 2,650 | -- | -- | | 5,220 | 7.10 | 12,400 | 846 | 735 | 81 | 24 | 8,700 | 7.7 |
| July 8-9 | 842 | 10 | | 42 | 9.2 | 130 | | 116 | 71 | 179 | -- | 4.5 | | a511 | .69 | 1,160 | 143 | 48 | 66 | 4.7 | 918 | 7.6 |
| July 10-12 | 75.0 | 8.4 | | 74 | 24 | 298 | | 107 | 167 | 472 | -- | 3.5 | | 1,100 | 1.50 | 223 | 283 | 196 | 70 | 7.7 | 1,960 | 7.3 |
| July 13 | 82.0 | 13 | | 91 | 30 | 445 | | 108 | 218 | 710 | -- | 2.2 | | 1,560 | 2.12 | 345 | 350 | 262 | 73 | 10 | 2,760 | 7.5 |
| July 14 | 161 | 14 | | 40 | 8.0 | 83 | | 93 | 49 | 130 | -- | 3.2 | | 373 | .51 | 162 | 133 | 57 | 58 | 3.1 | 674 | 7.8 |
| July 15, 17-19, 23 | 41.6 | 11 | | 65 | 31 | 292 | | 98 | 186 | 460 | -- | 3.2 | | 1,100 | 1.50 | 124 | 290 | 209 | 69 | 7.4 | 1,910 | 7.6 |
| July 16 | 77.0 | -- | | -- | -- | -- | | 119 | -- | 970 | -- | -- | | -- | -- | -- | 805 | 708 | -- | -- | 4,050 | 7.7 |
| July 20, 22, 24-31 | 15.2 | 6.6 | | 102 | 42 | 543 | | 91 | 278 | 880 | -- | 2.2 | | 1,900 | 2.58 | 78.0 | 427 | 352 | 73 | 11 | 3,310 | 7.5 |
| July 21 | 36.0 | -- | | -- | -- | -- | | 90 | -- | 1,620 | -- | -- | | -- | -- | -- | 585 | 511 | -- | -- | 5,570 | 7.5 |
| Aug. 1-8 | b .30 | -- | | -- | -- | -- | | 100 | -- | 980 | -- | -- | | -- | -- | -- | 490 | 408 | -- | -- | 3,750 | 7.2 |
| Aug. 9 | 34.0 | 5.8 | | 110 | 32 | 443 | | 94 | 292 | 700 | -- | 1.5 | | 1,630 | 2.22 | 150 | 406 | 329 | 70 | 9.6 | 2,790 | 7.2 |
| Aug. 10-18 | 15.4 | 9.0 | | 64 | 17 | 210 | | 88 | 137 | 334 | -- | 1.8 | | a840 | 1.14 | 34.9 | 230 | 158 | 67 | 6.0 | 1,450 | 7.2 |
| Aug. 19 | 37.0 | 13 | | 85 | 20 | 354 | | 106 | 170 | 565 | -- | 2.8 | | 1,260 | 1.71 | 126 | 294 | 207 | 72 | 9.0 | 2,260 | 7.3 |
| Aug. 20 (12 p.m.-12 m.) | 335 | 15 | | 78 | 17 | 170 | | 120 | 139 | 275 | -- | 2.5 | | 756 | 1.03 | 684 | 264 | 166 | 58 | 4.6 | 1,320 | 7.7 |
| Aug. 20 (12 m.-12 p.m.) | 335 | 14 | | 54 | 10 | 24 | | 189 | 25 | 32 | -- | 1.2 | | 253 | .34 | 229 | 176 | 21 | 23 | .8 | 414 | 7.0 |
| Aug. 21 | 174 | 11 | | 43 | 8.2 | 122 | | 105 | 63 | 178 | -- | 4.8 | | 482 | .66 | 226 | 141 | 55 | 65 | 4.5 | 860 | 7.1 |
| Aug. 22-25, 29-31 | 18.9 | 7.6 | | 108 | 29 | 702 | | 77 | 244 | 1,130 | -- | 3.5 | | 2,260 | 3.07 | 115 | 388 | 326 | 80 | 16 | 3,970 | 6.6 |
| Aug. 26-28 | 21.3 | 9.2 | | 178 | 52 | 1,280 | | 70 | 384 | 2,110 | -- | -- | | 4,050 | 5.51 | 233 | 658 | 600 | 81 | 22 | 6,900 | 7.1 |
| Sept. 1-9 | 5.19 | 4.6 | | 158 | 48 | 1,200 | | 77 | 392 | 1,940 | -- | 5.5 | | 3,790 | 5.15 | 53.1 | 592 | 528 | 82 | 21 | 6,530 | 6.8 |
| Sept. 10-14 | 34.4 | 9.0 | | 46 | 9.8 | 129 | | 106 | 83 | 184 | -- | 5.2 | | a550 | .75 | 51.1 | 156 | 68 | 64 | 4.5 | 953 | 7.3 |
| Sept. 15-21 | .34 | 7.0 | | 53 | 14 | 232 | | 80 | 151 | 332 | -- | 3.8 | | a868 | 1.18 | .80 | 190 | 124 | 73 | 7.3 | 1,500 | 7.2 |
| Sept. 22-30 | 0 | 5.8 | | 90 | 25 | 433 | | 84 | 254 | 660 | -- | 6.6 | | 1,520 | 2.07 | -- | 328 | 258 | 74 | 10 | 2,670 | 7.2 |
| Weighted average | 50.8 | 12 | | 71 | 20 | 268 | | 122 | 147 | 415 | -- | -- | | 1,000 | 1.36 | 137 | 259 | 159 | 69 | 7.2 | 1,700 | -- |

a Residue on evaporation at 180°C.
b Includes days of less than 0.05 cubic feet per second discharge.

## 1470. COLORADO RIVER NEAR SAN SABA, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 190, 5.2 miles downstream from San Saba River, 9.2 miles east of San Saba, San Saba County, and at mile 474.
DRAINAGE AREA.--30,600 square miles, approximately, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: September 1947 to September 1960.
Water temperatures: September 1947 to September 1960.
Sediment records: December 1950 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,300 ppm Aug. 13-14; minimum, 136 ppm Oct. 4-8.
Hardness: Maximum, 393 ppm May 3; minimum, 91 ppm Oct. 4-8.
Specific conductance: Maximum daily, 2,650 micromhos Aug. 13; minimum daily, 199 micromhos Oct. 4.
Water temperatures: Maximum, 90°F July 2, 13, 31; minimum, 39°F Mar. 3.
Sediment concentrations: Maximum daily, 2,870 ppm Apr. 28; minimum daily, 18 ppm Nov. 19-28.
Sediment loads: Maximum daily, 165,000 tons Oct. 6; minimum daily, 7.3 tons Nov. 24.
EXTREMES, 1947-60.--Dissolved solids: Maximum, 1,530 ppm Oct. 15-19, 1947; minimum, 102 ppm Sept. 23-25, 1955.
Hardness: Maximum, 522 ppm Oct. 15-19, 1947; minimum, 71 ppm June 25-30, 1949.
Specific conductance: Maximum daily, 3,420 micromhos Sept. 20, 1947; minimum daily, 161 micromhos Sept. 11, 1952.
Water temperatures: Maximum, 98°F Aug. 3, 1956; minimum, freezing point Jan. 29, 1948, Jan. 30, 1951.
Sediment concentrations (1950-60): Maximum daily, 10,500 ppm Oct. 20, 1956; minimum daily, no flow Aug. 27-31, 1954.
Sediment loads (1950-60): Maximum daily, 535,000 tons May 19, 1955; minimum daily, 0 tons Aug. 27-31, 1954.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C): Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1-3, 9-13, 1959--- | 5,032 | 14 | | 48 | 8.2 | 33 | | 136 | 28 | 46 | -- | 4.0 | | 270 | 0.37 | 3,670 | 153 | 26 | 32 | 1.2 | 458 | 7.6 |
| Oct. 4-8--- | 36,700 | 12 | | 30 | 4.0 | 12 | | 108 | 10 | 12 | -- | 2.8 | | 136 | .18 | 13,480 | 91 | 3 | 23 | .5 | 237 | 7.7 |
| Oct. 14-15--- | 10,770 | 12 | | 32 | 4.8 | 15 | | 115 | 12 | 16 | -- | 3.0 | | a152 | .21 | 4,420 | 100 | 5 | 24 | .7 | 266 | 7.6 |
| Oct. 16-31--- | 1,040 | 15 | | 70 | 17 | 41 | | 230 | 50 | 63 | -- | 6.4 | | 376 | .51 | 1,060 | 244 | 56 | 27 | 1.1 | 652 | 7.6 |
| Nov. 1-10--- | 796 | 12 | | 88 | 26 | 69 | | 254 | 98 | 113 | -- | 7.7 | | 565 | .77 | 1,210 | 326 | 118 | 31 | 1.7 | 929 | 7.8 |
| Nov. 11-20--- | 518 | 10 | | 90 | 26 | 86 | | 246 | 98 | 149 | -- | 5.1 | | 608 | .83 | 850 | 332 | 130 | 36 | 2.1 | 1,030 | 7.7 |
| Nov. 21-30--- | 392 | 12 | | 88 | 27 | 64 | | 282 | 72 | 112 | -- | 6.8 | | 548 | .75 | 580 | 330 | 100 | 30 | 1.5 | 924 | 7.6 |
| Dec. 1-16--- | 407 | 14 | | 90 | 27 | 73 | | 268 | 91 | 122 | -- | 9.0 | | 592 | .81 | 651 | 336 | 116 | 32 | 1.7 | 979 | 7.6 |
| Dec. 17-22--- | 915 | 13 | | 69 | 22 | 50 | | 218 | 66 | 84 | -- | 7.4 | | 437 | .59 | 1,080 | 262 | 84 | 29 | 1.3 | 740 | 7.9 |
| Dec. 23-31--- | 558 | 16 | | 94 | 32 | 77 | | 266 | 112 | 135 | -- | 9.4 | | 633 | .86 | 954 | 366 | 148 | 31 | 1.7 | 1,040 | 7.9 |
| Jan. 1-10, 1960--- | 3,152 | 9.4 | | 62 | 18 | 58 | | 165 | 69 | 101 | -- | 5.5 | | 435 | .59 | 3,700 | 228 | 94 | 35 | 1.7 | 721 | 7.3 |
| Jan. 11-23--- | 1,896 | 9.6 | | 60 | 18 | 52 | | 171 | 54 | 97 | -- | 4.8 | | 414 | .56 | 2,120 | 224 | 84 | 34 | 1.5 | 690 | 7.3 |
| Jan. 24-31, Feb. 1-5--- | 1,310 | 12 | | 69 | 17 | 70 | | 213 | 63 | 105 | -- | 6.7 | | 481 | .65 | 1,700 | 242 | 68 | 39 | 2.0 | 788 | 7.5 |
| Feb. 6-17--- | 1,016 | 12 | | 76 | 24 | 56 | | 233 | 64 | 104 | -- | 7.6 | | 492 | .67 | 1,350 | 288 | 97 | 30 | 1.4 | 805 | 7.7 |
| Feb. 18-29--- | 581 | 11 | | 80 | 31 | 60 | | 256 | 80 | 114 | -- | 5.3 | | 538 | .73 | 844 | 327 | 117 | 29 | 1.4 | 893 | 7.1 |
| Mar. 1-16--- | 491 | 11 | | 83 | 37 | 82 | | 255 | 107 | 148 | -- | 10 | | 648 | .88 | 859 | 359 | 150 | 33 | 1.9 | 1,030 | 7.6 |
| Mar. 17-31--- | 376 | 8.2 | | 78 | 37 | 86 | | 255 | 105 | 148 | -- | 8.4 | | 635 | .86 | 645 | 346 | 138 | 35 | 2.0 | 1,050 | 7.6 |
| Apr. 1-18--- | 294 | 7.6 | | 65 | 39 | 83 | 4.1 | 220 | 104 | 150 | 0.3 | 6.5 | | 595 | .81 | 472 | 322 | 142 | 36 | 2.0 | 994 | 7.8 |
| Apr. 19-27--- | 233 | 11 | | 66 | 38 | 81 | | 232 | 98 | 142 | .3 | 4.9 | | 589 | .80 | 371 | 321 | 131 | 35 | 2.0 | 985 | 7.7 |
| Apr. 28-30, May 1-2--- | 2,738 | 7.4 | | 59 | 19 | 59 | | 140 | 73 | 112 | .3 | 4.0 | | a403 | .55 | 2,980 | 225 | 110 | 36 | 1.7 | 733 | 7.5 |
| May 3--- | 1,380 | 5.6 | | 90 | 41 | 148 | | 140 | 144 | 315 | .4 | 6.7 | | a820 | 1.12 | 3,060 | 393 | 278 | 45 | 3.2 | 1,500 | 7.5 |
| May 4-13--- | 571 | 9.8 | | 65 | 22 | 69 | | 188 | 74 | 120 | .3 | 3.0 | | 488 | .66 | 752 | 252 | 98 | 37 | 1.9 | 816 | 7.8 |
| May 14--- | 485 | -- | | -- | -- | -- | | 139 | -- | 245 | -- | -- | | -- | -- | -- | 336 | 222 | -- | -- | 1,350 | 7.8 |
| May 15-31--- | 503 | 13 | | 62 | 17 | 83 | | 185 | 64 | 132 | -- | 1.8 | | 488 | .66 | 663 | 224 | 73 | 45 | 2.4 | 830 | 7.9 |
| June 1-11--- | 178 | 13 | | 54 | 23 | 67 | | 218 | 52 | 100 | -- | 1.8 | | 430 | .58 | 207 | 229 | 50 | 39 | 1.9 | 744 | 8.0 |
| June 12-25--- | 237 | 12 | | 79 | 35 | 112 | | 198 | 164 | 178 | -- | 1.5 | | 706 | .96 | 452 | 341 | 178 | 42 | 2.6 | 1,160 | 7.7 |
| June 26-30, July 1-5--- | 71.5 | 17 | | 55 | 37 | 73 | | 215 | 101 | 118 | -- | 1.5 | | 547 | .74 | 106 | 289 | 113 | 36 | 1.9 | 875 | 7.7 |
| July 6-12, 14--- | 86.4 | 18 | | 44 | 37 | 62 | | 218 | 75 | 99 | -- | 1.2 | | 464 | .63 | 108 | 262 | 84 | 34 | 1.7 | 771 | 7.6 |
| July 13, 15, 31, Aug. 1-5--- | 135 | 15 | | 84 | 39 | 141 | | 209 | 166 | 235 | -- | 1.5 | | 857 | 1.17 | 312 | 370 | 198 | 45 | 3.2 | 1,340 | 7.4 |
| July 16-30--- | 235 | 15 | | 67 | 31 | 85 | | 202 | 118 | 134 | -- | 1.5 | | 586 | .80 | 372 | 294 | 129 | 38 | 2.2 | 936 | 7.5 |
| Aug. 6-12--- | 172 | 14 | | 85 | 39 | 199 | | 191 | 187 | 322 | -- | .8 | | a941 | 1.28 | 437 | 372 | 216 | 54 | 4.5 | 1,610 | 7.3 |
| Aug. 13-14--- | 204 | 18 | | 78 | 35 | 354 | | 176 | 167 | 560 | -- | 1.5 | | a1,300 | 1.77 | 716 | 338 | 194 | 69 | 8.4 | 2,310 | 7.8 |
| Aug. 15-16--- | 254 | 16 | | 42 | 17 | 171 | | 135 | 86 | 246 | -- | .5 | | 647 | .88 | 444 | 175 | 64 | 68 | 5.6 | 1,160 | 7.8 |
| Aug. 17-31--- | 141 | 17 | | 49 | 22 | 106 | | 201 | 62 | 151 | -- | 1.5 | | 515 | .70 | 196 | 213 | 48 | 52 | 3.2 | 895 | 7.8 |
| Sept. 1-15--- | 82.5 | 17 | | 48 | 25 | 81 | | 207 | 56 | 121 | -- | .8 | | 470 | .64 | 105 | 223 | 54 | 44 | 2.4 | 796 | 7.7 |
| Sept. 16-23, 26-30--- | 114 | 14 | | 49 | 25 | 72 | | 209 | 53 | 110 | -- | .5 | | 459 | .62 | 141 | 226 | 54 | 41 | 2.1 | 758 | 7.8 |
| Sept. 24-25--- | 704 | 11 | | 36 | 10 | 33 | | 128 | 26 | 49 | -- | 1.8 | | a230 | .31 | 437 | 131 | 26 | 35 | 1.3 | 413 | 7.6 |
| Weighted average--- | 1,253 | 12 | | 50 | 13 | 40 | | 158 | 43 | 63 | -- | 4.2 | | 316 | 0.43 | 1,070 | 178 | 49 | 33 | 1.3 | 534 | -- |

a Calculated from determined constituents.

## 1580. COLORADO RIVER AT AUSTIN, TEX.

LOCATION.--At raw-water intake at Austin City Water Plant, just downstream from Lamar Street bridge in Austin, Travis County, half a mile downstream from Barton Creek and 4.5 miles upstream from gaging station at Montopolis bridge on U. S. Highway 183.
DRAINAGE AREA.--38,400 square miles, approximately, above gaging station, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1960.
Water temperatures: October 1947 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 286 ppm Sept. 1-30; minimum, 199 ppm Oct. 8-31.
Hardness: Maximum, 181 ppm Sept. 1-30; minimum, 120 ppm Oct. 8-31.
Specific conductance: Maximum daily, 486 micromhos Sept. 18; minimum daily, 304 micromhos Oct. 16.
Water temperatures: Maximum, 80°F Oct. 3; minimum, 49°F Feb. 26, Mar. 7.
EXTREMES, 1947-60.--Dissolved solids: Maximum, 340 ppm Nov. 1-30, 1951; minimum, 184 ppm July 1-31, 1957.
Hardness: Maximum, 214 ppm Jan. 1-31, 1954; minimum, 120 ppm Oct. 8-31, 1959.
Specific conductance: Maximum daily, 591 micromhos July 1, 1948; minimum daily, 243 micromhos Dec. 2, 1953.
Water temperatures: Maximum, 87°F on several days during summer months; minimum, 43°F Jan. 28, 1948, Feb. 4, 1949.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-7, 1959 | 12,230 | 9.8 | | 38 | 16 | 23 | 3.6 | 167 | 24 | 38 | 0.2 | 1.0 | | 243 | 0.33 | 8,030 | 161 | 24 | 23 | 0.8 | 428 | 7.8 |
| Oct. 8-31 | 9,247 | 12 | | 32 | 9.8 | 23 | | 126 | 19 | 31 | .3 | 2.0 | | 199 | .27 | 4,970 | 120 | 17 | 29 | .9 | 340 | 7.6 |
| Nov. 1-30 | 4,799 | 10 | | 37 | 14 | 27 | | 150 | 26 | 41 | -- | 1.8 | | 240 | .33 | 3,110 | 150 | 27 | 28 | 1.0 | 411 | 7.8 |
| Dec. 1-31 | 3,425 | 11 | | 40 | 14 | 32 | | 158 | 28 | 48 | .2 | 1.2 | | 258 | .35 | 2,390 | 158 | 28 | 31 | 1.1 | 445 | 7.7 |
| Jan. 1-31, 1960 | 3,136 | 11 | | 41 | 15 | 29 | | 162 | 26 | 46 | -- | 1.0 | | 252 | .34 | 2,130 | 164 | 31 | 27 | 1.0 | 444 | 8.0 |
| Feb. 1-29 | 3,494 | 9.2 | | 43 | 15 | 28 | | 168 | 27 | 44 | .2 | 1.8 | | 261 | .35 | 2,460 | 169 | 32 | 26 | .9 | 451 | 7.9 |
| Mar. 1-31 | 3,292 | 9.0 | | 43 | 17 | 24 | | 169 | 26 | 44 | .3 | 2.2 | | a248 | .34 | 2,200 | 178 | 39 | 23 | .8 | 444 | 7.7 |
| Apr. 1-30 | 3,007 | 9.0 | | 42 | 16 | 26 | 3.8 | 173 | 27 | 41 | .3 | 1.8 | | 256 | .35 | 2,080 | 171 | 29 | 24 | .9 | 451 | 7.5 |
| May 1-31 | 2,703 | 10 | | 43 | 15 | 29 | | 174 | 26 | 42 | .3 | 1.8 | | 260 | .35 | 1,900 | 169 | 26 | 27 | 1.0 | 453 | 7.6 |
| June 1-30 | 2,679 | 11 | | 44 | 15 | 28 | | 176 | 27 | 42 | .3 | .0 | | 272 | .37 | 1,970 | 172 | 28 | 26 | .9 | 455 | 7.6 |
| July 1-31 | 2,524 | 9.0 | | 45 | 16 | 26 | | 176 | 26 | 44 | .3 | 2.2 | | 265 | .36 | 1,810 | 178 | 34 | 24 | .8 | 452 | 7.5 |
| Aug. 1-31 | 1,966 | 12 | | 45 | 16 | 31 | | 184 | 26 | 45 | .7 | 1.8 | | 269 | .37 | 1,430 | 178 | 28 | 27 | 1.0 | 454 | 7.7 |
| Sept. 1-30 | 1,211 | 9.4 | | 46 | 16 | 33 | | 182 | 28 | 52 | .3 | .8 | | 286 | .39 | 935 | 181 | 32 | 28 | 1.1 | 488 | 7.6 |
| Weighted average | 3,520 | 10 | | 40 | 14 | 27 | | 160 | 25 | 41 | 0.3 | 1.6 | | 246 | 0.33 | 2,340 | 158 | 26 | 27 | 0.9 | 426 | -- |

a Calculated from determined constituents.

## 1620. COLORADO RIVER AT WHARTON, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59, in Wharton, Wharton County, 1,000 feet downstream from Texas & New Orleans Railroad Co. bridge, 12 miles upstream from Jones Creek, and at mile 67.
DRAINAGE AREA.--41,380 square miles, approximately, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: April 1944 to September 1960.
Water temperatures: October 1945 to September 1948, March 1950 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 279 ppm Sept. 1-30; minimum, 114 ppm June 26-28.
Hardness: Maximum, 188 ppm Sept. 1-30; minimum, 78 ppm May 1-3, June 26-28.
Specific conductance: Maximum daily, 532 micromhos Sept. 18; minimum daily, 181 micromhos June 26.
Water temperatures: Maximum, 88°F on several days during July and August; minimum, 42°F Feb. 26.
EXTREMES, 1944-60.--Dissolved solids: Maximum, 386 ppm Apr. 1-10, 1948; minimum, 108 ppm Sept. 27-29, 1957.
Hardness: Maximum, 231 ppm Feb. 1-10, 1947; minimum, 66 ppm Sept. 27-29, 1957.
Specific conductance: Maximum daily, 765 micromhos Feb. 5, 1957; minimum daily, 146 micromhos Sept. 27, 1957.
Water temperatures (1945-48, 1950-60): Maximum, 95°F July 26, 1954; minimum, 38°F Jan. 17, 1957.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-31, 1959 | 9,751 | 11 | | 37 | 11 | 19 | 3.9 | 140 | 23 | 30 | -- | 1.8 | | 216 | 0.29 | 5,690 | 138 | 23 | 23 | 0.7 | 388 | 7.4 |
| Nov. 1, 4-30 | 5,425 | 13 | | 42 | 11 | 23 | 3.8 | 154 | 27 | 36 | -- | 2.0 | | 240 | .33 | 3,520 | 150 | 24 | 24 | .8 | 409 | 7.4 |
| Nov. 2-3 | 10,120 | 13 | | 28 | 6.2 | 14 | 3.7 | 107 | 14 | 18 | -- | 1.8 | | a152 | .21 | 4,150 | 96 | 8 | 23 | .6 | 260 | 7.5 |
| Dec. 1-16, 20-31 | 3,783 | 12 | | 45 | 14 | 26 | 4.0 | 168 | 30 | 44 | -- | 2.0 | | 268 | .36 | 2,740 | 170 | 32 | 24 | .9 | 457 | 7.8 |
| Dec. 17-19 | 7,440 | 15 | | 32 | 7.6 | 18 | 4.0 | 112 | 22 | 28 | -- | 1.8 | | a183 | .25 | 3,680 | 112 | 20 | 25 | .7 | 308 | 7.6 |
| Jan. 1-31, 1960 | 4,003 | 12 | | 45 | 13 | 26 | 3.8 | 165 | 32 | 43 | -- | 2.0 | | 262 | .36 | 2,830 | 166 | 31 | 25 | .9 | 463 | 7.5 |
| Feb. 1-29 | 4,690 | 7.0 | | 46 | 13 | 23 | 3.5 | 168 | 28 | 38 | 0.3 | 3.2 | | 258 | .35 | 3,270 | 168 | 31 | 22 | .8 | 440 | 7.5 |
| Mar. 1-31 | 3,530 | 9.6 | | 48 | 15 | 26 | 3.7 | 182 | 31 | 42 | -- | 1.8 | | 278 | .38 | 2,650 | 182 | 32 | 23 | .8 | 477 | 7.8 |
| Apr. 1-30 | 4,254 | 8.8 | | 46 | 14 | 26 | 4.0 | 179 | 27 | 41 | .4 | 2.8 | | 264 | .36 | 3,030 | 172 | 26 | 24 | .9 | 455 | 7.9 |
| May 1-3 | 27,340 | 14 | | 26 | 3.2 | 7.4 | 3.6 | 92 | 9.0 | 8.5 | -- | 2.8 | | a120 | .16 | 8,860 | 78 | 2 | 16 | .4 | 194 | 7.2 |
| May 4-31 | 3,392 | 13 | | 46 | 12 | 25 | 3.9 | 174 | 28 | 39 | -- | 1.5 | | 265 | .36 | 2,430 | 164 | 22 | 24 | .8 | 443 | 7.5 |
| June 1-25 | 2,168 | 12 | | 40 | 15 | 31 | | 165 | 28 | 45 | .3 | 1.0 | | 255 | .35 | 1,490 | 162 | 26 | 30 | 1.1 | 444 | 7.4 |
| June 26-28 | 44,130 | 12 | | 26 | 3.0 | 9.4 | | 93 | 8.0 | 8.0 | .3 | 1.5 | | a114 | .16 | 13,580 | 78 | 2 | 21 | .5 | 190 | 7.4 |
| June 29-30, July 1 | 9,810 | 24 | | 35 | 5.8 | 17 | | 123 | 26 | 12 | .4 | 1.8 | | a182 | .25 | 4,820 | 112 | 10 | 24 | .7 | 272 | 7.9 |
| July 2-31 | 2,711 | 14 | | 46 | 14 | 28 | | 178 | 29 | 39 | .4 | 1.2 | | a260 | .35 | 1,900 | 172 | 26 | 26 | .9 | 442 | 7.6 |
| Aug. 1-31 | 2,089 | 13 | | 44 | 14 | 30 | | 172 | 26 | 44 | .3 | 1.2 | | 258 | .35 | 1,460 | 168 | 26 | 28 | 1.0 | 441 | 7.5 |
| Sept. 1-30 | 1,195 | 13 | | 47 | 17 | 31 | | 193 | 29 | 46 | .3 | 1.0 | | a279 | .38 | 900 | 188 | 30 | 26 | 1.0 | 491 | 7.5 |
| Weighted average | 4,576 | 12 | | 41 | 11 | 24 | | 153 | 25 | 34 | -- | 1.9 | | 231 | 0.31 | 2,850 | 148 | 22 | 26 | 0.9 | 397 | -- |

a Calculated from determined constituents.

MISCELLANEOUS ANALYSES OF STREAMS IN COLORADO RIVER BASIN IN TEXAS

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| BULL CREEK ½ MILE BELOW GAGING STATION NEAR IRA | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 11, 1959 | a0.01 | 5.2 | | 211 | 62 | 2,370 | 92 | 489 | 3,790 | | | | | b6,970 | 9.51 | | 782 | 706 | 87 | 37 | 11,500 | 7.5 |
| 1230. LAKE COLORADO CITY NEAR COLORADO CITY | | | | | | | | | | | | | | | | | | | | | | |
| May 18, 1960 | | 1.2 | | 38 | 11 | 49 | 172 | 52 | 37 | | 0.0 | | | 296 | 0.40 | | 140 | 0 | 43 | 1.8 | 493 | 7.8 |
| 1236. CHAMPION CREEK RESERVOIR NEAR COLORADO CITY | | | | | | | | | | | | | | | | | | | | | | |
| May 17, 1960 | | 1.1 | | 50 | 18 | 34 | 154 | 97 | 32 | | 0.0 | | | 332 | 0.45 | | 199 | 73 | 27 | 1.0 | 532 | 7.7 |
| COLORADO RIVER AT COUNTY BRIDGE ABOVE MOUTH OF BEALS CREEK | | | | | | | | | | | | | | | | | | | | | | |
| Apr. 30, 1960 | a25 | 3.0 | | 661 | 213 | 3,880 | 82 | 2,130 | 6,160 | | | | | b13,100 | 17.9 | | 2,520 | 2,460 | 77 | 34 | 19,500 | 5.9 |
| 1345. SAN ANGELO RESERVOIR AT SAN ANGELO | | | | | | | | | | | | | | | | | | | | | | |
| May 19, 1960 | | 1.8 | | 38 | 9.0 | 13 | 159 | 12 | 12 | | 0.2 | | | b164 | 0.22 | | 132 | 2 | 18 | 0.5 | 314 | 7.7 |
| SAN SABA RIVER AT U. S. HIGHWAY 87 BETWEEN BRADY AND MASON | | | | | | | | | | | | | | | | | | | | | | |
| May 19, 1960 | | 12 | | 48 | 20 | 15 | 231 | 16 | 20 | | 1.2 | | | 262 | 0.36 | | 202 | 13 | 14 | 0.5 | 445 | 7.7 |
| 1450. BRADY CREEK AT BRADY | | | | | | | | | | | | | | | | | | | | | | |
| May 19, 1960 | a2 | 4.6 | | 65 | 38 | 147 | 168 | 146 | 248 | | 0.2 | | | 802 | 1.09 | | 318 | 181 | 50 | 3.6 | 1,330 | 7.3 |
| 1515. LLANO RIVER AT LLANO | | | | | | | | | | | | | | | | | | | | | | |
| May 19, 1960 | c114 | 9.0 | | 35 | 22 | 19 | 197 | 16 | 29 | | 0.0 | | | 237 | 0.32 | | 178 | 16 | 19 | 0.6 | 417 | 7.7 |
| BULL CREEK AT DOERNTGE PARK ABOUT 5 MILES NORTHWEST OF AUSTIN | | | | | | | | | | | | | | | | | | | | | | |
| July 5, 1960 | | 16 | | 40 | 16 | 10 | 166 | 22 | 20 | 0.2 | 0.0 | | | 212 | 0.29 | | 166 | 30 | 12 | 0.3 | 358 | 7.6 |

a Field estimate.
b Calculated from determined constituents.
c Mean daily discharge.

## 1645. NAVIDAD RIVER NEAR GANADO, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59, 170 feet upstream from Texas & New Orleans Railraod Co. bridge, a quarter of a mile downstream from Sandy Creek, and 2½ miles southwest of Ganado, Jackson County.
DRAINAGE AREA.--1,116 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960.
Water temperatures: October 1959 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 480 ppm Nov. 16-30; minimum, 63 ppm Oct. 31.
Hardness: Maximum, 313 ppm Nov. 16-30; minimum, 30 ppm Oct. 31.
Specific conductance: Maximum daily, 840 micromhos Nov. 26; minimum daily, 98 micromhos Oct. 31.
Water temperatures: Maximum, 90°F June 15, July 12, 27; minimum, 41°F Feb. 12.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 26-30, 1959 | 53.0 | 25 | | 77 | 3.6 | 43 | | 258 | 12 | 53 | 0.3 | 0.5 | | a355 | 0.48 | 50.8 | 207 | 0 | 31 | 1.3 | 573 | 7.8 |
| Oct. 31 | 481 | -- | | 9.2 | 1.7 | -- | | 42 | -- | 7.0 | -- | -- | | 63 | .09 | 81.8 | 30 | 0 | -- | -- | 98 | 7.5 |
| Nov. 1-4 | 3,750 | 19 | | 24 | 2.6 | 7.0 | 5.0 | 89 | 5.6 | 9.0 | .2 | .5 | | 117 | .16 | 1,180 | 71 | 0 | 16 | .4 | 185 | 7.2 |
| Nov. 5-6 | 860 | 33 | | 44 | 4.1 | 25 | | 161 | 9.0 | 28 | .3 | .5 | | 223 | .30 | 518 | 127 | 0 | 30 | 1.0 | 346 | 8.2 |
| Nov. 7-15 | 126 | 26 | | 98 | 5.9 | 46 | | 323 | 17 | 60 | .4 | .5 | | a432 | .59 | 147 | 269 | 4 | 27 | 1.2 | 690 | 8.2 |
| Nov. 16-30 | 83.4 | 24 | | 115 | 6.3 | 50 | | 356 | 20 | 77 | .2 | .2 | | a480 | .65 | 108 | 313 | 22 | 26 | 1.2 | 792 | 7.5 |
| Dec. 1-9 | 63.9 | 22 | | 89 | 6.2 | 55 | | 284 | 20 | 79 | .3 | .2 | | 412 | .56 | 71.1 | 248 | 15 | 32 | 1.5 | 705 | 7.6 |
| Dec. 10-14, 20-22 | 447 | 14 | | 34 | 3.2 | 26 | | 113 | 12 | 34 | .2 | .8 | | 180 | .24 | 217 | 98 | 5 | 36 | 1.1 | 317 | 7.1 |
| Dec. 15-19 | 2,731 | 12 | | 17 | 2.0 | 14 | | 59 | 7.6 | 16 | .2 | .8 | | 99 | .13 | 730 | 51 | 2 | 37 | .9 | 166 | 6.7 |
| Dec. 23-29, 31 | 175 | 23 | | 70 | 4.9 | 42 | | 231 | 16 | 56 | .2 | .8 | | a342 | .47 | 162 | 194 | 5 | 32 | 1.3 | 548 | 8.1 |
| Dec. 30 | 95.0 | -- | | -- | -- | -- | | 155 | -- | 40 | -- | -- | | -- | -- | -- | 131 | 4 | -- | -- | 370 | 7.4 |
| Jan. 1-4, 1960 | 2,762 | 10 | | 13 | 1.8 | 13 | | 46 | 5.8 | 16 | .3 | .8 | | 84 | .11 | 626 | 40 | 2 | 38 | 1.0 | 147 | 7.1 |
| Jan. 5-7, 18 | 524 | 12 | | 21 | 2.0 | 17 | | 70 | 8.2 | 22 | .3 | 1.0 | | 118 | .16 | 167 | 61 | 3 | 38 | .9 | 208 | 6.8 |
| Jan. 8-17 | 208 | 26 | | 58 | 4.8 | 27 | | 191 | 14 | 36 | .3 | .8 | | 261 | .35 | 147 | 164 | 8 | 26 | .9 | 496 | 7.8 |
| Jan. 19-20 | 255 | 16 | | 38 | 3.8 | 25 | | 122 | 11 | 38 | -- | 1.0 | | 193 | .26 | 133 | 110 | 10 | 33 | 1.0 | 345 | 7.4 |
| Jan. 21-31 | 91.3 | 22 | | 87 | 5.6 | 48 | | 277 | 18 | 69 | .3 | 1.2 | | a410 | .56 | 101 | 240 | 13 | 30 | 1.3 | 662 | 7.7 |
| Feb. 1-2 | 59.5 | -- | | -- | -- | -- | | 271 | -- | 88 | -- | -- | | -- | -- | -- | 236 | 14 | -- | -- | 730 | 8.0 |
| Feb. 3, 8-12 | 156 | 16 | | 46 | 2.6 | 36 | | 155 | 13 | 44 | .2 | .5 | | 234 | .32 | 98.6 | 125 | 0 | 38 | 1.4 | 399 | 7.9 |
| Feb. 4-7 | 964 | 8.2 | | 16 | .8 | 19 | | 52 | 9.4 | 21 | .3 | 1.2 | | 102 | .14 | 265 | 43 | 1 | 48 | 1.3 | 176 | 7.3 |
| Feb. 13-17, 25-27 | 1,385 | 8.4 | | 15 | .8 | 17 | | 52 | 7.4 | 18 | .3 | .8 | | 94 | .13 | 352 | 41 | 0 | 47 | 1.2 | 156 | 7.2 |
| Feb. 18-24, 28-29 | 351 | 13 | | 41 | 2.7 | 31 | | 133 | 12 | 42 | .3 | .2 | | 207 | .28 | 196 | 113 | 4 | 38 | 1.3 | 356 | 7.8 |
| Mar. 1-4 | 278 | 16 | | 58 | 4.8 | 36 | | 187 | 15 | 51 | .3 | 1.2 | | 274 | .37 | 206 | 164 | 11 | 32 | 1.2 | 477 | 7.8 |
| Mar. 5-17 | 124 | 18 | | 82 | 6.2 | 56 | | 262 | 22 | 79 | .4 | 1.2 | | a410 | .56 | 137 | 230 | 16 | 34 | 1.6 | 673 | 7.9 |
| Mar. 18-31 | 105 | 16 | | 86 | 6.3 | 60 | | 274 | 23 | 86 | .4 | .8 | | a433 | .59 | 123 | 240 | 16 | 35 | 1.7 | 725 | 7.6 |
| Apr. 1-12 | 58.2 | 18 | | 80 | 6.6 | 68 | 4.1 | 263 | 23 | 96 | .5 | .8 | | a435 | .59 | 68.4 | 226 | 11 | 39 | 2.0 | 746 | 7.8 |
| Apr. 13-25 | 47.5 | 20 | | 86 | 6.8 | 69 | | 280 | 22 | 97 | .5 | 1.0 | | a450 | .61 | 57.7 | 242 | 13 | 38 | 1.9 | 763 | 7.7 |
| Apr. 26-30 | 1,229 | 8.8 | | 28 | 3.0 | 22 | | 92 | 9.6 | 30 | .4 | 2.2 | | 149 | .20 | 494 | 82 | 7 | 37 | 1.1 | 270 | 7.2 |
| May 1-6 | 1,515 | 14 | | 36 | 2.3 | 18 | | 121 | 8.0 | 19 | .3 | 3.0 | | 161 | .22 | 659 | 99 | 0 | 28 | .8 | 275 | 7.3 |
| May 7-10 | 178 | 24 | | 82 | 4.9 | 41 | | 270 | 17 | 52 | .4 | .8 | | a376 | .51 | 181 | 224 | 3 | 29 | 1.2 | 603 | 7.5 |
| May 11-20 | 96.7 | 30 | | 92 | 6.2 | 61 | | 304 | 24 | 80 | .4 | .8 | | a464 | .63 | 121 | 255 | 6 | 34 | 1.7 | 758 | 7.5 |
| May 21-31 | 78.1 | 25 | | 78 | 7.0 | 68 | | 268 | 23 | 90 | .4 | .5 | | a442 | .60 | 93.2 | 224 | 4 | 40 | 2.0 | 734 | 7.7 |
| June 1-10 | 41.0 | 28 | | 52 | 7.1 | 68 | | 187 | 20 | 93 | .4 | .0 | | a368 | .50 | 40.7 | 158 | 6 | 48 | 2.4 | 620 | 7.5 |
| June 11-24 | 28.2 | 24 | | 62 | 7.4 | 64 | | 214 | 18 | 92 | .4 | .2 | | a384 | .52 | 29.2 | 185 | 10 | 43 | 2.0 | 646 | 7.7 |
| June 25-30 | 17,240 | 9.0 | | 14 | 2.6 | 6.4 | 3.0 | 55 | 3.8 | 10 | .2 | 1.2 | | 77 | .10 | 3,580 | 46 | 1 | 22 | .4 | 127 | 6.6 |
| July 1-3 | 1,052 | 23 | | 30 | 4.9 | 17 | | 114 | 5.6 | 22 | .2 | 2.0 | | 161 | .22 | 457 | 93 | 2 | 28 | .8 | 257 | 7.2 |
| July 4-18 | 207 | 21 | | 68 | 6.0 | 37 | | 231 | 13 | 49 | .3 | .5 | | a332 | .45 | 186 | 194 | 4 | 29 | 1.2 | 519 | 7.7 |
| July 19-20 | 2,980 | 11 | | 11 | 2.2 | 16 | | 50 | 4.4 | 17 | .2 | 1.8 | | 89 | .12 | 716 | 36 | 0 | 49 | 1.2 | 138 | 7.2 |
| July 21-25 | 1,456 | 19 | | 24 | 4.3 | 20 | | 94 | 6.2 | 26 | .2 | 1.5 | | 147 | .20 | 578 | 78 | 1 | 36 | 1.0 | 239 | 6.9 |
| July 26-31 | 190 | 22 | | 56 | 5.9 | 35 | | 199 | 10 | 46 | .3 | .5 | | a294 | .40 | 151 | 164 | 1 | 32 | 1.2 | 461 | 7.2 |

a Residue on evaporation at 180°C.

1645. NAVIDAD RIVER NEAR GANADO, TEX.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Aug. 1-13, *1960 | 271 | 25 | | 44 | 7.1 | 37 | | 165 | 11 | 50 | 0.3 | 0.8 | | a272 | 0.37 | 199 | 139 | 4 | 36 | 1.4 | 433 | 7.1 |
| Aug. 14-17 | 5,065 | 13 | | 16 | 1.8 | 10 | | 61 | 1.4 | 12 | .2 | .8 | | 85 | .12 | 1,160 | 47 | 0 | 32 | .6 | 146 | 7.0 |
| Aug. 18-22 | 1,321 | 20 | | 24 | 4.1 | 20 | | 97 | 4.4 | 24 | .3 | .8 | | 146 | .20 | 521 | 77 | 0 | 36 | 1.0 | 240 | 7.0 |
| Aug. 23-29 | 479 | 22 | | 34 | 5.7 | 26 | | 130 | 6.6 | 35 | .3 | .5 | | 194 | .26 | 251 | 108 | 2 | 34 | 1.1 | 329 | 7.1 |
| Aug. 30-31 | 3,365 | -- | | -- | -- | -- | | 66 | -- | 15 | -- | -- | | -- | -- | -- | 52 | 0 | -- | -- | 154 | 7.2 |
| Sept. 1-2 | 1,425 | 21 | | 22 | 4.2 | 18 | | 89 | 4.4 | 23 | .2 | 1.0 | | 138 | .19 | 531 | 72 | 0 | 35 | .9 | 218 | 7.2 |
| Sept. 3-10 | 374 | 19 | | 33 | 6.9 | 26 | | 123 | 8.0 | 40 | .2 | .8 | | a208 | .28 | 210 | 111 | 10 | 34 | 1.1 | 330 | 6.8 |
| Sept. 11-20 | 170 | 18 | | 41 | 9.8 | 37 | | 160 | 12 | 56 | .2 | .8 | | a263 | .36 | 121 | 143 | 12 | 36 | 1.3 | 440 | 7.1 |
| Sept. 21-30 | 106 | 20 | | 55 | 8.9 | 51 | | 208 | 13 | 70 | .3 | .5 | | a334 | .45 | 95.6 | 174 | 3 | 39 | 1.7 | 563 | 7.1 |
| Weighted average | b798 | 13 | | 24 | 3.0 | 16 | | 86 | 6.2 | 20 | 0.2 | 1.1 | | 128 | 0.17 | 276 | 72 | 2 | 33 | 0.8 | 212 | -- |

a Residue on evaporation at 180°C.
b Represents 91 percent of flow for water year October 1959 to September 1960.

## 1765. GUADALUPE RIVER AT VICTORIA, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59 in Victoria, Victoria County, 1,300 feet upstream from Texas & New Orleans Railroad bridge, 10 miles upstream from Coleto Creek, and at mile 51.
DRAINAGE AREA.--5,161 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1948 to September 1960.
Water temperatures: November 1950 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 404 ppm July 5-20; minimum, 167 ppm June 26-30.
Hardness: Maximum, 258 ppm Mar. 11-20; minimum, 110 ppm June 26-30.
Specific conductance: Maximum daily, 748 micromhos Nov. 16; minimum daily, 262 micromhos June 27.
Water temperatures: Maximum, 87°F May 19; minimum, 42°F Feb. 12.
EXTREMES, 1945-46, 1948-60.--Dissolved solids: Maximum, 1,040 ppm Jan. 11-17, 1946; minimum, 134 ppm Oct. 17-21, 1957.
Hardness: Maximum, 428 ppm Jan. 11-17, 1946; minimum, 86 ppm Oct. 23-31, 1956.
Specific conductance: Maximum daily, 1,950 micromhos Jan. 11-17, 1946; minimum daily, 184 micromhos Oct. 24, 1956.
Water temperatures (1950-60): Maximum, 90°F Aug. 4, 27, 1952; minimum, 40°F Feb. 1-2, 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-3, 1959 | 735 | 20 | | 58 | 17 | 26 | 2.2 | 232 | 27 | 38 | -- | 3.2 | | 312 | 0.42 | 619 | 214 | 24 | 21 | 0.8 | 515 | 7.7 |
| Oct. 4-16 | 4,163 | 16 | | 46 | 9.2 | 13 | 3.4 | 165 | 19 | 18 | -- | 4.0 | | 220 | .30 | 2,470 | 153 | 18 | 15 | .5 | 354 | 7.6 |
| Oct. 17-31 | 1,421 | 18 | | 70 | 14 | 22 | 2.8 | 249 | 26 | 36 | -- | 6.3 | | 335 | .46 | 1,290 | 232 | 28 | 17 | .6 | 532 | 7.6 |
| Nov. 1-30 | 1,299 | 18 | | 70 | 17 | 27 | 2.9 | 262 | 32 | 41 | -- | 6.0 | | 346 | .47 | 1,210 | 244 | 30 | 19 | .8 | 577 | 8.2 |
| Dec. 1-10 | 1,024 | 17 | | 65 | 19 | 25 | 2.1 | 255 | 31 | 38 | -- | 5.5 | | a328 | .45 | 907 | 240 | 31 | 18 | .7 | 577 | 7.7 |
| Dec. 11-20 | 1,120 | 14 | | -- | 18 | 26 | 2.3 | -- | 31 | 40 | -- | 5.2 | | -- | -- | -- | -- | -- | -- | -- | 597 | -- |
| Dec. 21-31 | 1,191 | 15 | | 73 | 18 | 25 | 2.3 | 273 | 31 | 38 | -- | 5.7 | | a342 | .47 | 1,100 | 256 | 32 | 17 | .7 | 585 | 7.7 |
| Jan. 1-15, 1960 | 1,459 | 15 | | 69 | 16 | 25 | 2.3 | 256 | 32 | 36 | -- | 5.6 | | a327 | .44 | 1,290 | 238 | 28 | 18 | .7 | 571 | 7.7 |
| Jan. 16-31 | 1,404 | 16 | | 74 | 17 | 25 | 2.2 | 270 | 34 | 38 | -- | 5.3 | | a344 | .47 | 1,300 | 254 | 33 | 17 | .7 | 589 | 7.8 |
| Feb. 1-15 | 1,583 | 14 | | 70 | 17 | 25 | 2.3 | 255 | 34 | 36 | -- | 5.7 | | 331 | .45 | 1,410 | 244 | 36 | 18 | .7 | 566 | 7.8 |
| Feb. 16-29 | 1,429 | 10 | | 70 | 18 | 24 | 1.8 | 267 | 30 | 36 | -- | 5.3 | | 330 | .45 | 1,270 | 248 | 30 | 17 | .7 | 570 | 7.9 |
| Mar. 1-10 | 1,295 | 13 | | 70 | 16 | 26 | 2.1 | 257 | 31 | 40 | -- | 5.7 | | 345 | .47 | 1,210 | 240 | 30 | 19 | .7 | 572 | 7.6 |
| Mar. 11-20 | 1,188 | 15 | | 72 | 19 | 29 | 2.0 | 267 | 37 | 46 | -- | 5.2 | | 372 | .51 | 1,190 | 258 | 38 | 20 | .8 | 614 | 7.4 |
| Mar. 21-31 | 1,135 | 9.0 | | 60 | 19 | 28 | 1.9 | 239 | 33 | 43 | -- | 4.3 | | 325 | .44 | 996 | 228 | 32 | 21 | .8 | 558 | 7.4 |
| Apr. 1-14 | 1,192 | 14 | | 61 | 19 | 27 | 2.4 | 240 | 32 | 39 | 0.3 | 4.8 | | 323 | .44 | 1,040 | 230 | 34 | 20 | .8 | 546 | 7.8 |
| Apr. 15-27 | 1,098 | 15 | | 66 | 19 | 26 | 2.4 | 261 | 30 | 38 | .4 | 4.8 | | 332 | .45 | 984 | 242 | 28 | 19 | .7 | 563 | 7.8 |
| Apr. 28-30 | 2,683 | 13 | | 52 | 12 | 22 | 3.7 | 190 | 26 | 32 | .4 | 3.8 | | a258 | .35 | 1,870 | 179 | 24 | 21 | .7 | 445 | 7.6 |
| May 1-6 | 6,963 | 11 | | 43 | 6.1 | 16 | 4.3 | 141 | 27 | 20 | -- | 1.5 | | 201 | .27 | 3,780 | 132 | 17 | 20 | .6 | 344 | 7.5 |
| May 7-11 | 1,906 | 18 | | 60 | 11 | 31 | 4.3 | 198 | 37 | 48 | -- | 3.0 | | 316 | .43 | 1,630 | 194 | 32 | 25 | 1.0 | 534 | 7.4 |
| May 12-31 | 1,142 | 16 | | 73 | 18 | 34 | 2.8 | 270 | 35 | 54 | -- | 4.2 | | 374 | .51 | 1,150 | 256 | 34 | 22 | .9 | 645 | 7.6 |
| June 1-10 | 832 | 16 | | 54 | 20 | 38 | | 226 | 35 | 52 | .3 | 3.2 | | 351 | .48 | 788 | 216 | 32 | 27 | 1.1 | 565 | 7.5 |
| June 11-25 | 684 | 14 | | 52 | 19 | 34 | | 216 | 32 | 48 | .3 | 3.0 | | 316 | .43 | 584 | 208 | 30 | 26 | 1.0 | 531 | 7.4 |
| June 26-30 | 13,410 | 13 | | 34 | 6.0 | 17 | | 124 | 16 | 18 | .3 | 2.0 | | a167 | .23 | 6,050 | 110 | 8 | 25 | .7 | 286 | 7.2 |
| July 1-2 | 16,250 | 22 | | 40 | 4.8 | 15 | | 135 | 21 | 12 | .4 | 1.2 | | a182 | .25 | 7,990 | 120 | 9 | 21 | .6 | 283 | 7.6 |
| July 3-4 | 2,615 | -- | | -- | -- | -- | | 163 | -- | 22 | -- | -- | | -- | -- | -- | 142 | 8 | -- | -- | 360 | 7.8 |
| July 5-20 | 1,531 | 21 | | 76 | 16 | 46 | | 274 | 37 | 64 | .3 | 2.2 | | 404 | .55 | 1,670 | 256 | 31 | 28 | 1.3 | 660 | 7.5 |
| July 21-31 | 1,770 | 18 | | 63 | 14 | 32 | | 228 | 28 | 46 | .3 | 3.2 | | 328 | .45 | 1,570 | 214 | 28 | 25 | 1.0 | 537 | 7.2 |
| Aug. 1-10 | 951 | 24 | | 62 | 18 | 33 | | 250 | 30 | 44 | -- | 2.8 | | 350 | .48 | 899 | 228 | 24 | 24 | 1.0 | 565 | 7.6 |
| Aug. 11-18 | 1,524 | 24 | | 59 | 16 | 30 | | 237 | 26 | 39 | -- | 2.5 | | 326 | .44 | 1,340 | 213 | 19 | 23 | .9 | 519 | 7.6 |
| Aug. 19-31 | 2,635 | 17 | | 50 | 11 | 17 | | 190 | 19 | 20 | -- | 4.2 | | 246 | .33 | 1,750 | 170 | 14 | 18 | .6 | 388 | 7.7 |
| Sept. 1-15 | 1,262 | 19 | | 67 | 15 | 21 | | 244 | 23 | 32 | .3 | 4.7 | | 314 | .43 | 1,070 | 228 | 28 | 17 | .6 | 513 | 7.3 |
| Sept. 16-30 | 920 | 18 | | 66 | 17 | 26 | | 254 | 28 | 36 | .3 | 3.8 | | 328 | .45 | 815 | 234 | 26 | 20 | .7 | 548 | 7.2 |
| Weighted average | 1,764 | 16 | | 58 | 13 | 25 | | 215 | 27 | 33 | -- | 3.9 | | 288 | 0.39 | 1,370 | 198 | 22 | 22 | 0.8 | 481 | -- |

a Calculated from determined constituents.

## 1885. SAN ANTONIO RIVER AT GOLIAD, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 183, 1.3 miles southeast of courthouse in Goliad, Goliad County, and 10 miles upstream from Manahuilla Creek.
DRAINAGE AREA.--3,918 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1945 to September 1946, September 1958 to September 1960.
Water temperatures: September 1958 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 726 ppm June 11-24; minimum, 156 ppm July 21.
Hardness: Maximum, 356 ppm June 11-24; minimum, 90 ppm July 21.
Specific conductance: Maximum daily, 1,140 micromhos Nov. 19, June 22-23; minimum daily, 224 micromhos June 27.
Water temperatures: Maximum, 88°F July 12-14; minimum, 47°F Feb. 25, Mar. 2-3.
EXTREMES, 1945-46, 1958-60.--Dissolved solids: Maximum, 808 ppm Sept. 18, 1959; minimum, 156 ppm July 21, 1960.
Hardness: Maximum, 362 ppm Mar. 21-31, 1959; minimum, 90 ppm July 21, 1960.
Specific conductance: Maximum daily, 1,390 micromhos Apr. 3, 1959; minimum daily, 208 micromhos Apr. 24, 1946.
Water temperatures (1958-60): Maximum, 88°F July 12-14, 1960; minimum, 45°F Jan. 4, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-5, 1959 | 295 | 23 | | 83 | 19 | 89 | 7.8 | 270 | 86 | 116 | 0.6 | 9.9 | | a567 | 0.77 | 452 | 285 | 64 | 40 | 2.3 | 958 | 8.0 |
| Oct. 6-10 | 2,352 | 14 | | 37 | 5.4 | 31 | | 130 | 32 | 26 | .5 | 6.2 | | 225 | .31 | 1,430 | 114 | 8 | 37 | 1.3 | 368 | 7.7 |
| Oct. 11-21 | 446 | 20 | | 73 | 17 | 61 | | 230 | 79 | 75 | .5 | 8.9 | | 464 | .63 | 559 | 252 | 64 | 35 | 1.7 | 754 | 7.7 |
| Oct. 22-31 | 291 | 21 | | 93 | 21 | 80 | | 291 | 99 | 100 | .5 | 10 | | 590 | .80 | 464 | 318 | 80 | 35 | 2.0 | 952 | 7.8 |
| Nov. 1, 5-10 | 337 | 22 | | 92 | 16 | 87 | | 290 | 97 | 96 | .4 | 12 | | 584 | .79 | 531 | 296 | 58 | 39 | 2.2 | 919 | 8.2 |
| Nov. 2-4 | 787 | -- | | -- | -- | -- | | -- | -- | -- | -- | -- | | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nov. 11-20 | 351 | 22 | | 97 | 23 | 84 | | 306 | 95 | 108 | .6 | 14 | | 621 | .84 | 589 | 336 | 86 | 35 | 2.0 | 1,000 | 7.9 |
| Nov. 21-30 | 366 | 17 | | 88 | 21 | 70 | | 270 | 93 | 91 | .5 | 12 | | 546 | .74 | 540 | 306 | 84 | 33 | 1.7 | 892 | 7.6 |
| Dec. 1-15 | 324 | 19 | | 98 | 19 | 88 | | 305 | 100 | 104 | .6 | 14 | | 606 | .82 | 530 | 322 | 72 | 37 | 2.1 | 988 | 8.0 |
| Dec. 16-31 | 346 | 14 | | 96 | 22 | 79 | | 294 | 102 | 100 | .6 | 16 | | 581 | .79 | 543 | 330 | 89 | 34 | 1.9 | 978 | 7.6 |
| Jan. 1-15, 1960 | 414 | 19 | | 86 | 17 | 75 | | 269 | 89 | 91 | .4 | 12 | | 536 | .73 | 599 | 290 | 69 | 36 | 1.9 | 864 | 8.0 |
| Jan. 16-31 | 375 | 20 | | 94 | 19 | 79 | | 289 | 91 | 99 | .5 | 14 | | 563 | .77 | 570 | 312 | 76 | 35 | 1.9 | 915 | 8.0 |
| Feb. 1-15 | 416 | 21 | | 82 | 22 | 85 | | 285 | 90 | 99 | .4 | 14 | | 575 | .78 | 646 | 295 | 62 | 38 | 2.2 | 921 | 8.0 |
| Feb. 16-29 | 345 | 19 | | 92 | 22 | 87 | | 295 | 100 | 107 | .4 | 14 | | 598 | .81 | 557 | 320 | 78 | 37 | 2.1 | 973 | 7.9 |
| Mar. 1-10 | 349 | 21 | | 91 | 20 | 88 | | 290 | 98 | 104 | .6 | 15 | | 612 | .83 | 577 | 309 | 72 | 38 | 2.2 | 956 | 8.0 |
| Mar. 11-20 | 331 | 18 | | 94 | 22 | 89 | | 296 | 103 | 109 | .6 | 16 | | 630 | .86 | 563 | 325 | 82 | 37 | 2.1 | 1,000 | 7.7 |
| Mar. 21-29 | 388 | 16 | | 90 | 20 | 88 | | 281 | 100 | 107 | .6 | 14 | | 607 | .83 | 636 | 306 | 76 | 39 | 2.2 | 956 | 7.7 |
| Mar. 30-31 | 959 | 14 | | 54 | 11 | 46 | | 166 | 61 | 48 | .5 | 11 | | a328 | .45 | 849 | 178 | 42 | 36 | 1.5 | 551 | 7.6 |
| Apr. 1-10 | 387 | 19 | | 86 | 19 | 77 | 8.4 | 280 | 92 | 94 | .5 | 12 | | 559 | .76 | 584 | 292 | 63 | 36 | 2.0 | 898 | 8.0 |
| Apr. 11-20 | 313 | 20 | | 97 | 22 | 88 | | 306 | 104 | 108 | .5 | 13 | | 621 | .84 | 525 | 332 | 82 | 37 | 2.1 | 985 | 8.1 |
| Apr. 21-30 | 349 | 19 | | 90 | 20 | 94 | | 288 | 101 | 114 | .6 | 9.9 | | 609 | .83 | 574 | 306 | 70 | 40 | 2.3 | 982 | 7.9 |
| May 1-15 | 375 | 20 | | 82 | 18 | 76 | | 263 | 85 | 92 | .5 | 11 | | 514 | .70 | 520 | 278 | 63 | 37 | 2.0 | 867 | 7.8 |
| May 16-31 | 265 | 19 | | 94 | 20 | 89 | | 289 | 104 | 110 | .5 | 8.9 | | 587 | .80 | 420 | 316 | 80 | 38 | 2.2 | 982 | 7.8 |
| June 1-10 | 174 | 22 | | 104 | 20 | 96 | | 305 | 113 | 124 | .4 | 8.4 | | 675 | .92 | 317 | 342 | 92 | 38 | 2.3 | 1,040 | 8.0 |
| June 11-24 | 124 | 23 | | 105 | 23 | 106 | | 314 | 122 | 139 | .5 | 5.2 | | 726 | .99 | 243 | 356 | 99 | 39 | 2.4 | 1,100 | 8.0 |
| June 25, 27-30 | 2,656 | 13 | | 34 | 4.5 | 20 | | 112 | 25 | 18 | .2 | 3.2 | | a173 | .24 | 1,240 | 103 | 12 | 29 | .9 | 295 | 7.5 |
| June 26 | 407 | 18 | | 51 | 9.3 | 61 | | 147 | 44 | 90 | .3 | 4.0 | | a350 | .48 | 385 | 164 | 44 | 45 | 2.1 | 614 | 7.5 |
| July 1-4 | 416 | 22 | | 64 | 11 | 49 | | 190 | 62 | 60 | .5 | 5.3 | | 398 | .54 | 447 | 204 | 49 | 34 | 1.5 | 606 | 7.9 |
| July 5-19 | 258 | 16 | | 89 | 18 | 85 | | 278 | 93 | 104 | .6 | 9.2 | | a552 | .75 | 385 | 296 | 68 | 38 | 2.2 | 905 | 8.0 |
| July 20, 22-23 | 1,326 | 22 | | 51 | 9.7 | 49 | | 169 | 50 | 52 | .5 | 8.8 | | a326 | .44 | 1,170 | 167 | 28 | 39 | 1.6 | 541 | 7.9 |
| July 21 | 3,070 | 9.8 | | 25 | 6.6 | 21 | | 109 | 20 | 15 | .4 | 4.0 | | a156 | .21 | 1,290 | 90 | 1 | 34 | 1.0 | 265 | 7.3 |
| July 24-31 | 434 | 20 | | 64 | 15 | 63 | | 223 | 61 | 72 | .4 | 11 | | 448 | .61 | 525 | 221 | 38 | 38 | 1.8 | 704 | 7.6 |
| Aug. 1-12 | 304 | 23 | | 91 | 18 | 85 | | 280 | 90 | 108 | .5 | 11 | | 583 | .79 | 479 | 301 | 72 | 38 | 2.1 | 914 | 8.0 |
| Aug. 13-14, 19-20 | 1,405 | 16 | | 34 | 4.7 | 21 | | 109 | 27 | 20 | .3 | 4.9 | | a182 | .25 | 690 | 104 | 15 | 31 | .9 | 286 | 7.7 |
| Aug. 15-18 | 586 | 17 | | 49 | 7.5 | 42 | | 145 | 46 | 51 | .3 | 5.5 | | 299 | .41 | 473 | 153 | 34 | 37 | 1.5 | 483 | 7.3 |
| Aug. 21-22, 30-31 | 756 | 16 | | 40 | 5.7 | 26 | | 128 | 31 | 28 | .3 | 3.5 | | 222 | .30 | 453 | 123 | 18 | 32 | 1.0 | 353 | 7.5 |
| Aug. 23-29 | 359 | 20 | | 76 | 14 | 62 | | 236 | 71 | 75 | .4 | 8.0 | | 453 | .62 | 439 | 247 | 54 | 35 | 1.7 | 732 | 7.5 |
| Sept. 1-6 | 363 | 19 | | 60 | 12 | 58 | | 188 | 58 | 75 | .4 | 5.8 | | 396 | .54 | 388 | 199 | 45 | 39 | 1.8 | 658 | 7.7 |
| Sept. 7-16 | 234 | 21 | | 89 | 19 | 81 | | 272 | 93 | 105 | .5 | 8.9 | | 565 | .77 | 357 | 300 | 77 | 37 | 2.0 | 919 | 7.8 |
| Sept. 17-25, 28-30 | 194 | 18 | | 94 | 22 | 91 | | 292 | 106 | 116 | .5 | 8.6 | | 612 | .83 | 321 | 325 | 86 | 38 | 2.2 | 1,010 | 7.6 |
| Sept. 26-27 | 296 | 15 | | 56 | 11 | 58 | | 175 | 57 | 74 | .4 | 4.0 | | a361 | .49 | 289 | 184 | 41 | 41 | 1.9 | 629 | 7.4 |
| Weighted average b | 429 | 18 | | 72 | 15 | 65 | | 232 | 74 | 78 | 0.5 | 9.8 | | 460 | 0.63 | 333 | 244 | 54 | 37 | 1.8 | 745 | -- |

a Calculated from determined constituents.
b Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1959 to September 1960.

MISCELLANEOUS ANALYSES OF STREAMS IN GUADALUPE RIVER BASIN IN TEXAS

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| 1870. ESCONDIDO RESERVOIR NO. 1 NEAR KENEDY | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 26, 1959 | | 12 | | 36 | 2.0 | 3.8 | 7.4 | 131 | 0.6 | 3.0 | 0.4 | 0.8 | | 143 | 0.19 | | 98 | 0 | 7 | 0.2 | 233 | 7.0 |
| Aug. 2, 1960 | | 8.0 | | 43 | 2.2 | 12 | | 163 | .6 | 4.8 | .3 | .2 | | a151 | .21 | | 116 | 0 | 18 | .5 | 271 | 7.0 |

a Calculated from determined constituents.

## 2110. NUECES RIVER NEAR MATHIS, TEX.

LOCATION.--At intake tower at Wesley E. Seale Dam, 0.6 mile upstream from gaging station at bridge on State Highway 359, and 4 miles southwest of Mathis, San Patricio County.
DRAINAGE AREA.--16,660 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1960.
Water temperatures: October 1947 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 354 ppm Oct. 1-18; minimum, 224 ppm Oct. 19-31, Dec. 1-31.
Hardness: Maximum, 176 ppm Apr. 1-30; minimum, 131 ppm Oct. 19-31.
Specific conductance: Maximum daily, 616 micromhos Oct. 2; minimum daily, 334 micromhos Oct. 26.
Water temperatures: Maximum, 87°F June 1-2; minimum, 53°F Feb. 26, Mar. 1-2.
EXTREMES, 1947-60.--Dissolved solids: Maximum, 548 ppm June 1-30, 1948; minimum, 175 ppm Apr. 27-30, 1949.
Hardness: Maximum, 201 ppm May 1-24, 1951; minimum, 85 ppm Apr. 27-30, 1949.
Specific conductance: Maximum daily, 1,040 micromhos July 1, 1948; minimum daily, 233 micromhos July 30, 1949.
Water temperatures: Maximum, 94°F July 27, 1948; minimum, 38°F Jan. 31, 1948.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (residue at 180°C) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-18, 1959 | 3,922 | 23 | | 52 | 8.9 | 53 | 9.2 | 197 | 38 | 66 | 0.2 | 2.0 | | 354 | 0.48 | 3,750 | 166 | 4 | 39 | 1.8 | 592 | 7.1 |
| Oct. 19-31 | 4,952 | 23 | | 44 | 5.1 | 19 | 8.0 | 165 | 17 | 18 | .2 | 1.5 | | 224 | .30 | 2,990 | 131 | 0 | 23 | .7 | 350 | 7.4 |
| Nov. 1-30 | 318 | 27 | | 48 | 5.0 | 18 | 7.8 | 182 | 16 | 16 | -- | 1.5 | | 232 | .32 | 199 | 140 | 0 | 21 | .7 | 364 | 7.8 |
| Dec. 1-31 | 107 | 20 | | 49 | 5.3 | 16 | 7.7 | 186 | 16 | 14 | -- | 1.5 | | 224 | .30 | 64.7 | 144 | 0 | 18 | .6 | 359 | 8.0 |
| Jan. 1-31, 1960 | 95.3 | 18 | | 51 | 5.7 | 17 | 7.7 | 194 | 17 | 14 | -- | 1.0 | | 235 | .32 | 60.5 | 150 | 0 | 19 | .6 | 378 | 8.0 |
| Feb. 1-29 | 131 | 12 | | 54 | 6.3 | 18 | 7.5 | 201 | 18 | 18 | .2 | 1.5 | | 254 | .35 | 89.8 | 160 | 0 | 19 | .6 | 402 | 7.4 |
| Mar. 1-31 | 73.3 | 15 | | 56 | 6.3 | 21 | 7.6 | 207 | 20 | 20 | .3 | 1.0 | | 260 | .35 | 51.5 | 166 | 0 | 21 | .7 | 419 | 7.7 |
| Apr. 1-30 | 87.6 | 17 | | 59 | 7.0 | 25 | 7.6 | 215 | 22 | 31 | .3 | .5 | | a275 | .37 | 65.0 | 176 | 0 | 23 | .8 | 445 | 8.1 |
| May 1-31 | 85.8 | 18 | | 58 | 7.1 | 34 | | 213 | 25 | 32 | .2 | 1.5 | | 290 | .39 | 67.2 | 174 | 0 | 30 | 1.1 | 475 | 7.4 |
| June 1-30 | 231 | 19 | | 55 | 8.0 | 40 | | 208 | 26 | 40 | .3 | 1.2 | | 292 | .40 | 182 | 170 | 0 | 34 | 1.3 | 493 | 7.0 |
| July 1-31 | 298 | 17 | | 48 | 8.2 | 46 | | 192 | 29 | 46 | -- | .8 | | 312 | .42 | 251 | 154 | 0 | 39 | 1.6 | 490 | 7.5 |
| Aug. 1-31 | 889 | 18 | | 46 | 7.4 | 49 | | 184 | 29 | 49 | .3 | .5 | | 300 | .41 | 720 | 146 | 0 | 42 | 1.8 | 484 | 7.7 |
| Sept. 1-30 | 480 | 15 | | 45 | 7.4 | 47 | | 182 | 30 | 46 | -- | .8 | | 293 | .40 | 380 | 143 | 0 | 42 | 1.7 | 486 | 7.8 |
| Weighted average | 602 | 21 | | 48 | 7.1 | 41 | | 185 | 27 | 41 | -- | 1.4 | | 288 | 0.39 | 468 | 149 | 0 | 37 | 1.5 | 469 | -- |

a Calculated from determined constituents.

## 3640. RIO GRANDE NEAR EL PASO, TEX.

LOCATION.--At gaging station 5 miles northwest of El Paso, El Paso County, 6 miles northwest of Juarez, Chihuahua, and 1.9 miles above the American Dam.
DRAINAGE AREA.--29,267 square miles.
RECORDS AVAILABLE.--Chemical analyses: 1933 to 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959-- | 31 | 138 | -- | | 131 | 34 | 336 | -- | 271 | 548 | 291 | -- | 0.6 | 0.40 | 1,576 | 2.14 | | 468 | 246 | 61 | 6.7 | 2,320 | 7.9 |
| November------ | 30 | 103 | -- | | 128 | 33 | 348 | -- | 278 | 555 | 296 | -- | .6 | .37 | 1,554 | 2.11 | | 454 | 227 | 62 | 7.1 | 2,350 | 8.3 |
| December------ | 29 | 107 | -- | | 143 | 31 | 346 | -- | 299 | 565 | 302 | -- | .6 | .25 | 1,631 | 2.22 | | 484 | 240 | 61 | 6.8 | 2,400 | 8.0 |
| January 1960-- | 27 | 93.0 | 33 | | 137 | 32 | 347 | 14 | 309 | 548 | 305 | 0.8 | .6 | .28 | 1,640 | 2.23 | | 473 | 220 | 61 | 6.9 | 2,380 | 8.1 |
| February------ | 28 | 66.4 | -- | | 138 | 33 | 369 | -- | 313 | 573 | 314 | -- | .6 | .37 | 1,709 | 2.32 | | 478 | 222 | 63 | 7.3 | 2,470 | 8.2 |
| March--------- | 31 | 825 | -- | | 78 | 19 | 116 | -- | 181 | 237 | 99 | -- | .6 | .16 | 667 | .91 | | 272 | 123 | 48 | 3.1 | 1,080 | 8.2 |
| April--------- | 30 | 650 | -- | | 100 | 20 | 149 | -- | 229 | 293 | 121 | -- | .6 | .21 | 845 | 1.15 | | 332 | 145 | 49 | 3.5 | 1,280 | 7.9 |
| May----------- | 31 | 677 | -- | | 99 | 21 | 148 | -- | 232 | 294 | 119 | -- | .6 | .11 | 852 | 1.16 | | 334 | 144 | 49 | 3.5 | 1,270 | 7.9 |
| June---------- | 30 | 887 | -- | | 92 | 19 | 130 | -- | 214 | 275 | 104 | -- | .6 | .22 | 770 | 1.05 | | 307 | 132 | 48 | 3.2 | 1,170 | 7.9 |
| July---------- | 28 | 990 | 24 | | 89 | 19 | 129 | 7.8 | 201 | 264 | 105 | .8 | .6 | .19 | 769 | 1.05 | | 303 | 138 | 47 | 3.2 | 1,150 | 8.0 |
| August-------- | 31 | 1,005 | -- | | 89 | 19 | 131 | -- | 214 | 263 | 103 | -- | .6 | .11 | 753 | 1.02 | | 299 | 124 | 49 | 3.3 | 1,140 | 8.0 |
| September----- | 30 | 615 | -- | | 104 | 21 | 172 | -- | 247 | 319 | 145 | -- | .6 | .15 | 945 | 1.29 | | 346 | 144 | 52 | 4.0 | 1,420 | 7.9 |

(a) Includes equivalent of any carbonate ($CO_3$) present.

3705. RIO GRANDE BELOW OLD FORT QUITMAN, TEX.

LOCATION.--At gaging station at the rectified channel of the Rio Grande, 1.5 miles below Old Fort Quitman, Hudspeth County, and 81.1 river miles below the American Dam at El Paso.
DRAINAGE AREA.--32,035 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: 1933 to 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959-- | 5 | 16.6 | -- | | 121 | 26 | 292 | -- | 198 | 409 | 330 | -- | 1.2 | 0.40 | 1,346 | 1.69 | | 410 | 248 | 61 | 6.3 | 2,080 | 7.8 |
| November------ | 4 | 21.3 | -- | | 227 | 62 | 698 | -- | 276 | 873 | 869 | -- | .6 | .49 | 2,994 | 4.07 | | 823 | 596 | 65 | 11 | 4,480 | 8.4 |
| December------ | 5 | 24.1 | -- | | 277 | 73 | 764 | -- | 311 | 903 | 1,070 | -- | .6 | .52 | 3,398 | 4.62 | | 993 | 738 | 63 | 11 | 5,040 | 7.9 |
| January 1960-- | 4 | 5.61 | 20 | | 337 | 90 | 938 | 13 | 282 | 993 | 1,420 | 1.0 | .6 | .52 | 4,210 | 5.73 | | 1,210 | 982 | 62 | 12 | 6,140 | 8.2 |
| February------ | 4 | 1.44 | -- | | 621 | 179 | 1,650 | -- | 295 | 1,450 | 2,920 | -- | .6 | .77 | 7,484 | 10.2 | | 2,290 | 2,040 | 61 | 15 | 10,600 | 7.9 |
| March--------- | 5 | 1.10 | -- | | 715 | 224 | 2,130 | -- | 250 | 1,750 | 3,780 | -- | 1.2 | 1.0 | 9,642 | 13.1 | | 2,700 | 2,500 | 63 | 18 | 13,300 | 7.9 |
| April--------- | 4 | 3.97 | -- | | 455 | 139 | 1,460 | -- | 256 | 1,430 | 2,270 | -- | .6 | .85 | 6,152 | 8.37 | | 1,710 | 1,500 | 65 | 15 | 8,980 | 7.8 |
| May----------- | 5 | 3.32 | -- | | 379 | 107 | 890 | -- | 253 | 836 | 1,600 | -- | .6 | .49 | 4,410 | 6.00 | | 1,380 | 1,180 | 58 | 10 | 6,290 | 7.8 |
| June---------- | 7 | 8.00 | -- | | 168 | 41 | 418 | -- | 287 | 431 | 574 | -- | 2.5 | .38 | 1,892 | 2.57 | | 590 | 355 | 61 | 7.5 | 2,970 | 8.0 |
| July---------- | 8 | 307 | 22 | | 143 | 31 | 292 | 5.5 | 250 | 391 | 363 | 1.0 | .6 | .33 | 1,446 | 1.97 | | 482 | 278 | 56 | 5.8 | 2,200 | 8.0 |
| August-------- | 7 | 47.8 | -- | | 298 | 81 | 797 | -- | 275 | 878 | 1,190 | -- | .6 | .55 | 3,554 | 4.83 | | 1,080 | 852 | 62 | 11 | 5,410 | 8.1 |
| September----- | 4 | 74.1 | -- | | 243 | 60 | 636 | -- | 296 | 790 | 833 | -- | 1.2 | .45 | 2,899 | 3.94 | | 852 | 609 | 62 | 9.5 | 4,300 | 7.9 |

(a) Includes equivalent of any carbonate ($CO_3$) present.

## 3715. RIO GRANDE AT UPPER PRESIDIO, TEX.

LOCATION.--At gaging station 7.8 river miles above the junction of the Rio Conchos, and about 10 miles northwest of Presidio, Presidio County, and 285.7 river miles below the American Dam at El Paso.
DRAINAGE AREA.--34,988 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: 1935 to 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959-- | 2 | 11.9 | | | | | 46 | | 149 | | 34 | | | | 343 | 0.47 | | 172 | 49 | 37 | 1.5 | 542 | |
| November------ | 0 | 0 | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| December------ | 0 | 0 | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| January 1960-- | 0 | 0 | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| February------ | 0 | -- | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| March--------- | 0 | 0 | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| April--------- | 0 | 0 | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| May----------- | 0 | 0 | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| June---------- | 0 | 0 | | | | | -- | | -- | | -- | | | | -- | -- | | -- | -- | -- | -- | -- | |
| July---------- | 9 | 139 | 18 | | 112 | 17 | 182 | 7.0 | 180 | 305 | 204 | 0.4 | 1.9 | 0.18 | 984 | 1.34 | | 350 | 203 | 42 | 4.2 | 1,500 | 7.9 |
| August-------- | 10 | 148 | | | | | 192 | | 169 | | 239 | | | | 1,012 | 1.38 | | 350 | 212 | 54 | 4.5 | 1,570 | |
| September----- | 3 | 32.8 | | | | | 97 | | 156 | | 92 | | | | 617 | .84 | | 258 | 130 | 45 | 2.6 | 936 | |

## 3750. RIO GRANDE NEAR JOHNSON RANCH, TEX.

LOCATION.--At gaging station about 2 miles upstream from Johnson Ranch, Brewster County, 14 miles downstream from Castolon, and 392.9 river miles below the American Dam at El Paso.
DRAINAGE AREA.--70,715 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: 1948 to 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959--- | 5 | 499 | -- | | -- | -- | 202 | -- | 165 | -- | 128 | -- | | -- | 1,155 | 1.57 | | 400 | 266 | 52 | 4.4 | 1,610 | -- |
| November------- | 5 | 524 | -- | | -- | -- | 178 | -- | 171 | -- | 106 | -- | | -- | 1,001 | 1.36 | | 365 | 225 | 51 | 4.1 | 1,450 | -- |
| December------- | 7 | 491 | -- | | -- | -- | 183 | -- | 195 | -- | 110 | -- | | -- | 1,076 | 1.46 | | 389 | 229 | 51 | 4.0 | 1,520 | -- |
| January 1960--- | 8 | 799 | 32 | | 87 | 18 | 136 | 6.3 | 128 | 369 | 75 | 1.5 | | 0.30 | 838 | 1.14 | | 290 | 185 | 50 | 3.5 | 1,170 | 8.2 |
| February------- | 5 | 1,227 | -- | | -- | -- | 88 | -- | 156 | -- | 51 | -- | | -- | 589 | .80 | | 229 | 102 | 46 | 2.5 | 843 | -- |
| March---------- | 8 | 813 | -- | | -- | -- | 106 | -- | 187 | -- | 67 | -- | | -- | 673 | .92 | | 286 | 132 | 45 | 2.7 | 1,020 | -- |
| April---------- | 9 | 346 | -- | | -- | -- | 172 | -- | 163 | -- | 113 | -- | | -- | 982 | 1.34 | | 356 | 222 | 51 | 4.0 | 1,430 | -- |
| May------------ | 9 | 233 | -- | | -- | -- | 214 | -- | 134 | -- | 145 | -- | | -- | 1,159 | 1.58 | | 381 | 271 | 55 | 4.8 | 1,670 | -- |
| June----------- | 7 | 387 | -- | | -- | -- | 186 | -- | 171 | -- | 117 | -- | | -- | 1,046 | 1.42 | | 358 | 218 | 53 | 4.3 | 1,490 | -- |
| July----------- | 9 | 2,830 | 22 | | 94 | 9.8 | 76 | 5.1 | 173 | 240 | 36 | 1.0 | 2.5 | .19 | 601 | .82 | | 276 | 134 | 37 | 2.0 | 851 | 7.9 |
| August--------- | 9 | 3,578 | -- | | -- | -- | 60 | -- | 180 | -- | 28 | -- | | -- | 477 | .65 | | 225 | 78 | 37 | 1.7 | 690 | -- |
| September------ | 8 | 2,235 | -- | | -- | -- | 69 | -- | 173 | -- | 37 | -- | | -- | 503 | .68 | | 225 | 84 | 40 | 2.0 | 745 | -- |

(a) Includes equivalent of any carbonate ($CO_3$) present.

3775. RIO GRANDE AT LANGTRY, TEX.

LOCATION.--At gaging station at Langtry, Val Verde County, 24.1 miles above the confluence with the Pecos River and 614.1 river miles below the American Dam at El Paso.
DRAINAGE AREA.--84,795 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: 1944 to 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Dissolved solids: Tons per day | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| October 1959-- | 4 | 1,425 | -- | | 86 | 17 | 97 | -- | 167 | 254 | 67 | -- | 2.5 | 0.21 | 660 | 0.90 | | 282 | 146 | 43 | 2.5 | 963 | 7.7 |
| November------ | 4 | 854 | -- | | 57 | 21 | 134 | -- | 67 | 329 | 89 | -- | 1.2 | .27 | 680 | .92 | | 230 | 175 | 56 | 3.9 | 1,060 | 8.1 |
| December------ | 4 | 802 | -- | | 98 | 21 | 126 | -- | 189 | 329 | 82 | -- | 1.9 | .23 | 808 | 1.10 | | 330 | 175 | 45 | 3.0 | 1,170 | 7.9 |
| January 1960-- | 3 | 1,098 | 22 | | 81 | 18 | 113 | 5.5 | 174 | 290 | 64 | 1.5 | 1.9 | .25 | 727 | .99 | | 278 | 135 | 46 | 3.0 | 1,040 | 8.2 |
| February------ | 4 | 1,657 | -- | | 69 | 15 | 86 | -- | 146 | 226 | 51 | -- | .6 | .09 | 589 | .80 | | 232 | 112 | 45 | 2.5 | 838 | 8.2 |
| March--------- | 3 | 1,262 | -- | | 78 | 17 | 84 | -- | 186 | 213 | 53 | -- | 2.5 | .19 | 583 | .79 | | 266 | 113 | 41 | 2.2 | 881 | 8.1 |
| April--------- | 3 | 669 | -- | | 83 | 20 | 106 | -- | 177 | 264 | 71 | -- | 1.2 | .19 | 682 | .93 | | 288 | 144 | 44 | 2.7 | 1,030 | 7.8 |
| May----------- | 3 | 486 | -- | | 78 | 21 | 111 | -- | 165 | 280 | 76 | -- | .6 | .25 | 688 | .94 | | 282 | 148 | 46 | 2.9 | 1,040 | 7.7 |
| June---------- | 2 | 750 | -- | | 93 | 21 | 120 | -- | 171 | 324 | 82 | -- | 1.2 | .28 | 765 | 1.04 | | 316 | 176 | 45 | 2.9 | 1,140 | 8.1 |
| July---------- | 4 | 3,757 | 22 | | 85 | 10 | 56 | 5.5 | 177 | 183 | 28 | .8 | 3.1 | .18 | 511 | .69 | | 254 | 108 | 32 | 1.5 | 729 | 7.9 |
| August-------- | 6 | 4,033 | -- | | 82 | 8.3 | 68 | -- | 180 | 180 | 41 | -- | 1.2 | .21 | 527 | .72 | | 238 | 90 | 38 | 1.9 | 759 | 7.8 |
| September----- | 7 | 3,159 | -- | | 75 | 8.4 | 57 | -- | 193 | 142 | 30 | -- | 3.7 | .08 | 451 | .61 | | 221 | 62 | 36 | 1.7 | 676 | 8.0 |

(a) Includes equivalent of any carbonate ($CO_3$) present.

## 4101. PECOS RIVER BELOW RED BLUFF DAM NEAR ORLA, TEX.

LOCATION.--Just below dam, 3 miles upstream from Salt (Screwbean) Draw, 5 miles northwest of Orla, Reeves County, and 14 miles upstream from gaging station near Orla.
DRAINAGE AREA.--20,720 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1960.
Water temperatures: March 1953 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 12,600 ppm July 8-18; minimum, 6,480 ppm Nov. 1-30.
Hardness: Maximum, 2,650 ppm July 8-18; minimum, 1,990 ppm Dec. 1-31.
Specific conductance: Maximum daily, 18,400 micromhos July 9; minimum daily, 8,050 micromhos Oct. 6.
Water temperatures: Maximum, 78°F July 12-13; minimum, 45°F Jan. 23-26.
EXTREMES, 1937-60.--Dissolved solids: Maximum, 15,600 ppm Sept. 17-30, 1953; minimum, 1,090 ppm June 1-2, 1948.
Hardness: Maximum, 3,430 ppm July 1-31, Oct. 1-16, 1953; minimum, 602 ppm June 1-2, 1948.
Specific conductance: Maximum daily, 24,200 micromhos Sept. 28, 30, 1953; minimum daily, 1,610 micromhos June 2, 1948.
Water temperatures (1953-60): Maximum, 81°F Aug. 1-4, 1958; minimum, 40°F on several days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Orla for water year October 1959 to September 1960 given in Water-Supply Paper 1712. Mean discharge values reported below have been adjusted to exclude inflow from Salt (Screwbean) Draw which enters Pecos River between sampling point and gaging station.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-31, 1959 | 14.6 | 18 | | 540 | 163 | 1,650 | 48 | 144 | 1,720 | 2,680 | | | | 6,890 | 9.37 | 272 | 2,020 | 1,900 | 63 | 16 | 10,200 | 7.6 |
| Nov. 1-30 | 1.34 | 17 | | 530 | 180 | 1,500 | | 138 | 1,860 | 2,320 | | | | 6,480 | 8.81 | 23.4 | 2,060 | 1,930 | 61 | 14 | 9,300 | 7.7 |
| Dec. 1-31 | 32.6 | 17 | | 530 | 162 | 1,570 | | 138 | 1,880 | 2,370 | | | | 6,600 | 8.98 | 581 | 1,990 | 1,880 | 63 | 15 | 9,520 | 7.2 |
| Jan. 1-31, 1960 | 3.21 | 14 | | 555 | 183 | 1,580 | | 141 | 1,890 | 2,480 | | | | 6,770 | 9.21 | 58.7 | 2,140 | 2,020 | 62 | 15 | 9,790 | 7.5 |
| Feb. 1-29 | 2.06 | 13 | | 555 | 172 | 1,590 | | 258 | 1,910 | 2,380 | | | | 6,750 | 9.18 | 37.5 | 2,090 | 1,880 | 62 | 15 | 9,450 | 7.6 |
| Mar. 1-31 | 1.76 | 12 | | 555 | 195 | 1,810 | | 140 | 1,960 | 2,820 | | | | 7,420 | 10.1 | 35.3 | 2,190 | 2,070 | 64 | 17 | 10,700 | 7.4 |
| Apr. 1-30 | 225 | 11 | | 550 | 201 | 1,810 | 51 | 142 | 2,010 | 2,800 | | | | 7,500 | 10.2 | 4,560 | 2,200 | 2,080 | 63 | 17 | 10,700 | 7.1 |
| May 1-31 | 114 | 10 | | 578 | 209 | 1,910 | | 129 | 2,110 | 2,940 | | | | 7,820 | 10.7 | 2,410 | 2,300 | 2,200 | 64 | 17 | 11,100 | 7.2 |
| June 1-30 | 72.4 | 10 | | 592 | 215 | 2,100 | | 131 | 2,210 | 3,210 | | | | 8,400 | 11.5 | 1,640 | 2,360 | 2,250 | 66 | 19 | 11,900 | 7.2 |
| July 1-7, 19-31 | 117 | 10 | | 597 | 223 | 2,140 | | 126 | 2,200 | 3,310 | | | | 8,540 | 11.7 | 2,700 | 2,410 | 2,300 | 66 | 19 | 12,000 | 7.3 |
| July 8-18 | 9.73 | 14 | | 595 | 284 | 3,610 | | 125 | 2,360 | 5,630 | | | | 12,600 | 17.3 | 331 | 2,630 | 2,550 | 75 | 31 | 18,000 | 7.3 |
| Aug. 1-31 | 93.0 | 12 | | 597 | 201 | 1,960 | | 127 | 2,110 | 3,030 | | | | 7,970 | 10.9 | 2,000 | 2,320 | 2,210 | 65 | 18 | 11,400 | 6.9 |
| Sept. 1-30 | 108 | 15 | | 535 | 181 | 1,750 | | 130 | 1,860 | 2,720 | | | | 7,120 | 9.68 | 2,080 | 2,080 | 1,970 | 65 | 17 | 10,300 | 7.0 |
| Weighted average | 62.1 | 12 | | 566 | 201 | 1,900 | | 134 | 2,040 | 2,920 | | | | 7,710 | 10.5 | 1,290 | 2,240 | 2,130 | 65 | 17 | 11,000 | -- |

## 4465. PECOS RIVER NEAR GIRVIN, TEX.

LOCATION.--At supplementary gage at bridge on U. S. Highway 67, about half a mile downstream from Panhandle & Santa Fe Railway Co. bridge, 2.1 miles east of Girvin, Pecos County, 6½ miles downstream from Comanche Creek and 7.8 miles downstream from regular gaging station.
DRAINAGE AREA.--29,560 square miles, approximately (contributing area at supplementary gage).
RECORDS AVAILABLE.--Chemical analyses: October 1939 to June 1941, October 1946 to September 1947, October 1953 to September 1960.
Water temperatures: October 1953 to January 1959.
EXTREMES, 1959-60.--Hardness: Maximum, 4,900 ppm May 1-31; minimum, 2,350 ppm July 1-31.
Specific conductance: Maximum daily, 25,900 micromhos on several days during May; minimum daily, 12,700 micromhos July 20, 22-24, 31.
EXTREMES, 1939-41, 1946-47, 1953-60.--Hardness: Maximum, 5,040 ppm June 1-30, 1956; minimum, 330 ppm May 18, 1957.
Specific conductance: Maximum daily, 29,100 micromhos Aug. 13, 1958; minimum daily, 790 micromhos Apr. 26, 1957.
Water temperatures (1953-59): Maximum, 93°F June 1, 1954; minimum, 38°F Feb. 3-4, 1956.
REMARKS.--Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1959 to September 1960 given in Water-Supply Paper 1712.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| Oct. 1-31, 1959 | 17.1 | | | | | 4,020 | | 67 | 3,580 | 6,400 | | | | | | | 4,080 | 4,020 | 68 | 27 | 21,000 | 7.5 |
| Nov. 1-30 | 23.1 | | | | | 4,050 | | 129 | 3,590 | 6,530 | | | | | | | 4,060 | 3,950 | 68 | 28 | 21,200 | 7.4 |
| Dec. 1-31 | 28.4 | | | | | 3,770 | | 172 | 3,280 | 6,040 | | | | | | | 3,780 | 3,640 | 68 | 27 | 19,400 | 7.6 |
| Jan. 1-31, 1960 | 32.5 | | | | | 3,830 | | 182 | 3,410 | 5,950 | | | | | | | 3,770 | 3,620 | 69 | 27 | 20,300 | 7.5 |
| Feb. 1-29 | 33.7 | | | | | 4,060 | | 223 | 3,660 | 6,340 | | | | | | | 3,960 | 3,780 | 69 | 28 | 20,200 | 7.5 |
| Mar. 1-31 | 27.3 | | | | | 4,180 | | 164 | 3,680 | 6,630 | | | | | | | 4,090 | 3,960 | 69 | 28 | 21,500 | 7.7 |
| Apr. 1-30 | 19.2 | | | | | 4,680 | | 52 | 4,220 | 7,310 | | | | | | | 4,410 | 4,370 | 70 | 31 | 23,500 | 6.9 |
| May 1-31 | 11.0 | | | | | 5,230 | | 58 | 4,870 | 8,000 | | | | | | | 4,900 | 4,850 | 70 | 32 | 25,300 | 6.8 |
| June 1-30 | 19.6 | | | | | 4,900 | | 50 | 4,370 | 7,700 | | | | | | | 4,640 | 4,600 | 70 | 31 | 24,000 | 6.4 |
| July 1-31 | 35.1 | | | | | 2,470 | | 84 | 2,270 | 3,830 | | | | | | | 2,350 | 2,280 | 70 | 22 | 13,300 | 6.7 |
| Aug. 1-31 | 21.4 | | | | | 3,750 | | 67 | 3,190 | 5,950 | | | | | | | 3,570 | 3,520 | 70 | 27 | 18,700 | 7.1 |
| Sept. 1-30 | 26.3 | 6.5 | | | | 3,480 | | 59 | 3,070 | 5,500 | | | | | | | 3,390 | 3,340 | 69 | 26 | 18,000 | 7.4 |
| Weighted average | 24.5 | | | | | 3,890 | | 120 | 3,460 | 6,120 | | | | | | | 3,780 | 3,680 | 69 | 28 | 19,900 | -- |

## PECOS RIVER NEAR SHUMLA, TEX.

LOCATION.--At gaging station about 6 miles north of Shumla, Val Verde County, 13.0 miles upstream from the Pecos High Bridge and 18.5 river miles upstream from the confluence with the Rio Grande.
DRAINAGE AREA.--35,162 square miles (from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959-- | 5 | 1,643 | -- | | 87 | 28 | 154 | -- | 159 | 172 | 252 | -- | 6.2 | 0.11 | 842 | 1.15 | | 330 | 200 | 50 | 3.7 | 1,380 | 7.7 |
| November------ | 4 | 323 | -- | | 114 | 48 | 263 | -- | 189 | 270 | 438 | -- | 6.2 | .19 | 1,262 | 1.72 | | 480 | 324 | 54 | 5.2 | 2,120 | 8.4 |
| December------ | 4 | 265 | -- | | 140 | 61 | 353 | -- | 192 | 358 | 598 | -- | 5.0 | .20 | 1,744 | 2.37 | | 602 | 445 | 56 | 6.3 | 2,770 | 7.8 |
| January 1960-- | 4 | 267 | 10 | | 158 | 70 | 433 | 6.6 | 183 | 425 | 736 | 0.8 | 9.3 | .21 | 2,104 | 2.86 | | 679 | 529 | 58 | 7.2 | 3,280 | 8.1 |
| February------ | 4 | 254 | -- | | 162 | 73 | 470 | -- | 171 | 457 | 800 | -- | 3.7 | .22 | 2,293 | 3.12 | | 704 | 564 | 59 | 7.7 | 3,480 | 8.0 |
| March--------- | 5 | 233 | -- | | 169 | 77 | 498 | -- | 171 | 471 | 844 | -- | 3.7 | .21 | 2,304 | 3.13 | | 738 | 597 | 59 | 8.0 | 3,630 | 7.9 |
| April--------- | 4 | 198 | -- | | 165 | 78 | 499 | -- | 165 | 473 | 851 | -- | 2.5 | .24 | 2,315 | 3.15 | | 732 | 596 | 60 | 8.0 | 3,640 | 7.7 |
| May----------- | 5 | 154 | -- | | 148 | 67 | 415 | -- | 156 | 400 | 716 | -- | 1.2 | .25 | 1,983 | 2.70 | | 642 | 515 | 58 | 7.1 | 3,140 | 7.7 |
| June---------- | 4 | 131 | -- | | 118 | 58 | 357 | -- | 126 | 343 | 610 | -- | 1.2 | .24 | 1,651 | 2.25 | | 534 | 431 | 59 | 6.7 | 2,690 | 7.7 |
| July---------- | 4 | 311 | 16 | | 141 | 69 | 445 | 5.5 | 143 | 425 | 745 | 1.0 | 2.5 | .29 | 2,032 | 2.76 | | 636 | 519 | 60 | 7.7 | 3,260 | 7.9 |
| August-------- | 5 | 198 | -- | | 117 | 52 | 331 | -- | 142 | 311 | 557 | -- | 1.9 | .26 | 1,519 | 2.07 | | 504 | 388 | 59 | 6.4 | 2,500 | 8.1 |
| September----- | 5 | 139 | -- | | 119 | 52 | 325 | -- | 138 | 311 | 560 | -- | 2.5 | .19 | 1,526 | 2.08 | | 511 | 398 | 58 | 6.3 | 2,520 | 7.8 |

(a) Includes equivalent of any carbonate ($CO_3$) present.

## 4590. RIO GRANDE AT LAREDO, TEX.

LOCATION.--At gaging station at railroad bridge between Laredo, Webb County, and Nuevo Laredo, Tamaulipas, 884.3 miles below the American Dam at El Paso.
DRAINAGE AREA.--135,976 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: July 1955 to September 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959-- | 31 | 6,366 | -- | | -- | -- | 48 | -- | 156 | -- | 59 | -- | -- | -- | 387 | 0.53 | | 207 | 80 | 33 | 1.5 | 614 | -- |
| November------ | 30 | 3,003 | -- | | -- | -- | 83 | -- | 175 | -- | 96 | -- | -- | -- | 559 | .76 | | 264 | 120 | 41 | 2.2 | 894 | -- |
| December------ | 31 | 2,464 | -- | | -- | -- | 93 | -- | 181 | -- | 106 | -- | -- | -- | 623 | .85 | | 280 | 131 | 42 | 2.4 | 964 | -- |
| January 1960-- | 31 | 2,604 | 24 | | 82 | 21 | 104 | 4.3 | 177 | 195 | 122 | 0.8 | 5.0 | 0.18 | 692 | .94 | | 292 | 148 | 43 | 2.6 | 1,060 | 8.1 |
| February------ | 29 | 3,009 | -- | | -- | -- | 100 | -- | 171 | -- | 111 | -- | -- | -- | 649 | .88 | | 278 | 138 | 44 | 2.6 | 992 | -- |
| March--------- | 31 | 2,495 | -- | | -- | -- | 94 | -- | 171 | -- | 112 | -- | -- | -- | 574 | .78 | | 268 | 128 | 43 | 2.5 | 962 | -- |
| April--------- | 30 | 1,652 | -- | | -- | -- | 111 | -- | 162 | -- | 142 | -- | -- | -- | 663 | .90 | | 282 | 150 | 46 | 2.9 | 1,070 | -- |
| May----------- | 31 | 1,489 | -- | | -- | -- | 91 | -- | 156 | -- | 117 | -- | -- | -- | 572 | .78 | | 256 | 128 | 44 | 2.5 | 939 | -- |
| June---------- | 30 | 1,042 | -- | | -- | -- | 102 | -- | 151 | -- | 121 | -- | -- | -- | 608 | .83 | | 260 | 136 | 46 | 2.7 | 987 | -- |
| July---------- | 31 | 4,658 | 20 | | 75 | 12 | 69 | 4.7 | 159 | 156 | 66 | 1.0 | 4.3 | .13 | 511 | .69 | | 236 | 106 | 38 | 2.0 | 780 | 7.8 |
| August-------- | 31 | 4,469 | -- | | -- | -- | 68 | -- | 165 | -- | 59 | -- | -- | -- | 523 | .71 | | 246 | 110 | 38 | 1.9 | 790 | -- |
| September----- | 30 | 4,842 | -- | | -- | -- | 50 | -- | 159 | -- | 41 | -- | -- | -- | 409 | .56 | | 210 | 80 | 34 | 1.5 | 641 | -- |

(a) Includes equivalent of any carbonate ($CO_3$) present.

## RIO GRANDE BELOW FALCON DAM, TEX.

LOCATION.--Immediately below Falcon Dam, Starr County, 2.5 miles upstream from gaging station near Chapeno, 970.9 river miles below the American Dam at El Paso.
DRAINAGE AREA.--164,482 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: July 1955 to September 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959-- | 9 | 1,582 | -- | | 65 | 17 | 74 | -- | 126 | 168 | 82 | -- | 1.2 | 0.16 | 503 | 0.68 | | 232 | 128 | 41 | 2.1 | 796 | 7.7 |
| November------ | 6 | 713 | -- | | 63 | 20 | 75 | -- | 113 | 188 | 82 | -- | .6 | .09 | 504 | .69 | | 238 | 146 | 41 | 2.1 | 814 | 8.0 |
| December------ | 8 | 2,163 | -- | | 65 | 17 | 72 | -- | 134 | 165 | 81 | -- | (b) | .15 | 526 | .72 | | 230 | 120 | 41 | 2.1 | 795 | 7.6 |
| January 1960-- | 11 | 5,774 | 18 | | 65 | 15 | 76 | 5.9 | 131 | 165 | 85 | 0.6 | .6 | .16 | 521 | .71 | | 223 | 116 | 42 | 2.2 | 817 | 8.0 |
| February------ | 7 | 4,242 | -- | | 68 | 16 | 74 | -- | 131 | 171 | 82 | -- | .6 | .13 | 528 | .72 | | 234 | 127 | 41 | 2.1 | 805 | 8.0 |
| March--------- | 6 | 1,082 | -- | | 72 | 17 | 75 | -- | 145 | 171 | 86 | -- | .6 | .17 | 514 | .70 | | 248 | 129 | 40 | 2.1 | 838 | 8.0 |
| April--------- | 10 | 2,316 | -- | | 71 | 17 | 79 | -- | 146 | 174 | 89 | -- | .6 | .15 | 534 | .73 | | 248 | 128 | 41 | 2.2 | 861 | 7.9 |
| May----------- | 14 | 3,968 | -- | | 72 | 19 | 83 | -- | 151 | 180 | 92 | -- | .6 | .19 | 549 | .75 | | 258 | 134 | 41 | 2.3 | 887 | 7.8 |
| June---------- | 12 | 9,260 | -- | | 69 | 19 | 86 | -- | 138 | 188 | 96 | -- | .6 | .15 | 559 | .76 | | 250 | 136 | 43 | 2.4 | 899 | 7.8 |
| July---------- | 10 | 3,123 | 12 | | 67 | 21 | 92 | 4.7 | 132 | 193 | 103 | .8 | (b) | .22 | 596 | .81 | | 253 | 144 | 43 | 2.5 | 918 | 7.8 |
| August-------- | 9 | 1,311 | -- | | 67 | 19 | 95 | -- | 131 | 197 | 105 | -- | .6 | .19 | 582 | .79 | | 245 | 138 | 46 | 2.7 | 928 | 7.8 |
| September----- | 4 | 632 | -- | | 65 | 19 | 92 | -- | 125 | 195 | 101 | -- | 1.9 | .19 | 570 | .78 | | 240 | 138 | 46 | 2.6 | 905 | 7.9 |

(a) Includes equivalent of any carbonate ($CO_3$) present.
(b) Less than 0.4 parts per million.

## RIO GRANDE AT FORT RINGGOLD, RIO GRANDE CITY, TEX.

LOCATION.--At gaging station about one mile downstream from Rio Grande City, Starr County, 3.9 miles below the mouth of the Rio San Juan, and 1,014.3 river miles below the American Dam at El Paso.
DRAINAGE AREA.--180,396 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: January 1959 to September 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959-- | 31 | 1,838 | -- | | 69 | 18 | 94 | -- | 135 | 180 | 113 | -- | 1.2 | 0.22 | 581 | 0.79 | | 246 | 136 | 45 | 2.6 | 930 | 7.7 |
| November------ | 30 | 862 | -- | | 74 | 18 | 109 | -- | 140 | 191 | 131 | -- | 1.2 | .21 | 633 | .86 | | 262 | 146 | 47 | 2.9 | 1,010 | 8.1 |
| December------ | 31 | 2,082 | -- | | 69 | 16 | 82 | -- | 137 | 172 | 91 | -- | .6 | .16 | 557 | .76 | | 236 | 124 | 43 | 2.3 | 845 | 7.7 |
| January 1960-- | 31 | 5,660 | 11 | | 70 | 14 | 75 | 5.1 | 134 | 168 | 82 | 0.6 | .6 | .14 | 530 | .72 | | 232 | 122 | 41 | 2.2 | 812 | 8.0 |
| February------ | 29 | 4,398 | -- | | 63 | 16 | 80 | -- | 116 | 168 | 89 | -- | .6 | .18 | 537 | .73 | | 221 | 126 | 44 | 2.3 | 806 | 8.0 |
| March--------- | 31 | 1,111 | -- | | 67 | 19 | 101 | -- | 125 | 192 | 121 | -- | -- | .23 | 581 | .79 | | 246 | 144 | 47 | 2.8 | 971 | 8.1 |
| April--------- | 30 | 2,605 | -- | | 74 | 17 | 85 | -- | 146 | 178 | 98 | -- | .6 | .18 | 560 | .76 | | 252 | 132 | 42 | 2.3 | 894 | 7.8 |
| May----------- | 31 | 3,861 | -- | | 74 | 18 | 86 | -- | 153 | 180 | 96 | -- | -- | .18 | 564 | .77 | | 258 | 134 | 42 | 2.3 | 895 | 7.7 |
| June---------- | 30 | 9,411 | -- | | 71 | 19 | 86 | -- | 145 | 185 | 96 | -- | 1.2 | .17 | 552 | .75 | | 256 | 136 | 42 | 2.4 | 898 | 7.8 |
| July---------- | 31 | 3,497 | 13 | | 68 | 22 | 92 | 4.3 | 146 | 191 | 105 | .8 | .6 | .25 | 604 | .82 | | 260 | 140 | 43 | 2.5 | 930 | 7.8 |
| August-------- | 31 | 1,773 | -- | | 69 | 16 | 95 | -- | 148 | 176 | 102 | -- | .6 | .15 | 573 | .78 | | 238 | 116 | 46 | 2.7 | 901 | 7.8 |
| September----- | 30 | 1,220 | -- | | 65 | 13 | 83 | -- | 136 | 155 | 91 | -- | 3.7 | .23 | 503 | .68 | | 216 | 104 | 46 | 2.5 | 818 | 7.8 |

(a) Includes equivalent of any carbonate ($CO_3$) present.

## RIO GRANDE AT ANZALDUAS DAM, TEX.

LOCATION.--At gaging station 0.5 mile below Anzalduas Dam, Hidalgo County, 12.2 miles upstream from Hidalgo, and 1,077.1 river miles below the American Dam at El Paso.
DRAINAGE AREA.--182,138 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: March 1959 to September 1960.
REMARKS.--Chemical analyses by U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of specific conductance of daily samples and records of discharge for water year October 1959 to September 1960 given in International Boundary and Water Commission Water Bulletin Numbers 29 and 30.

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Month | Number of samples | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) (a) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| October 1959--- | 4 | 1,795 | -- | | 80 | 22 | 141 | -- | 143 | 217 | 183 | -- | 0.6 | 0.35 | 769 | 1.05 | | 292 | 175 | 51 | 3.6 | 1,220 | 7.9 |
| November------- | 5 | 662 | -- | | 114 | 35 | 269 | -- | 167 | 325 | 387 | -- | .6 | .61 | 1,269 | 1.73 | | 430 | 293 | 58 | 5.6 | 2,070 | 7.9 |
| December------- | 5 | 1,701 | -- | | 84 | 24 | 160 | -- | 151 | 229 | 209 | -- | .6 | .33 | 839 | 1.14 | | 306 | 183 | 53 | 4.0 | 1,320 | 7.9 |
| January 1960--- | 4 | 2,139 | 8 | | 63 | 22 | 98 | 5.9 | 137 | 185 | 117 | 0.6 | .6 | .17 | 613 | .83 | | 250 | 138 | 45 | 2.7 | 960 | 8.0 |
| February------- | 5 | 1,328 | -- | | 82 | 21 | 133 | -- | 149 | 211 | 167 | -- | .6 | .20 | 745 | 1.01 | | 290 | 167 | 50 | 3.4 | 1,170 | 8.1 |
| March---------- | 4 | 912 | -- | | 119 | 36 | 274 | -- | 181 | 324 | 394 | -- | .6 | .62 | 1,288 | 1.75 | | 442 | 294 | 57 | 5.7 | 2,090 | 7.9 |
| April---------- | 15 | 1,701 | -- | | 86 | 22 | 144 | -- | 157 | 225 | 188 | -- | .6 | .31 | 794 | 1.08 | | 306 | 178 | 51 | 3.6 | 1,270 | 8.0 |
| May------------ | 29 | 1,552 | -- | | 84 | 23 | 139 | -- | 159 | 220 | 177 | -- | -- | .30 | 764 | 1.04 | | 302 | 172 | 50 | 3.5 | 1,240 | 7.8 |
| June----------- | 30 | 4,017 | -- | | 76 | 21 | 116 | -- | 145 | 206 | 143 | -- | .6 | .22 | 669 | .91 | | 274 | 156 | 48 | 3.0 | 1,070 | 7.8 |
| July----------- | 31 | 2,082 | 16 | | 79 | 24 | 153 | 3.9 | 143 | 231 | 194 | .8 | .6 | .40 | 822 | 1.12 | | 298 | 180 | 52 | 3.8 | 1,290 | 7.8 |
| August--------- | 31 | 956 | -- | | 90 | 26 | 191 | -- | 153 | 257 | 252 | -- | .6 | .38 | 949 | 1.29 | | 330 | 204 | 56 | 4.6 | 1,520 | 7.8 |
| September------ | 21 | 1,161 | -- | | 85 | 21 | 167 | -- | 135 | 207 | 239 | -- | 1.2 | .41 | 831 | 1.13 | | 297 | 186 | 55 | 4.2 | 1,370 | 7.9 |

(a) Includes equivalent of any carbonate ($CO_3$) present.

MISCELLANEOUS ANALYSES OF STREAMS IN RIO GRANDE BASIN IN TEXAS

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids (calculated) | | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Tons per day | Calcium, magnesium | Noncarbonate | | | | |
| LIVE OAK CREEK NORTH OF U. S. HIGHWAY 290 NEAR OLD FORT LANCASTER | | | | | | | | | | | | | | | | | | | | | | |
| Dec. 7, 1959---------- | a10 | 20 | | 365 | 98 | 1,230 | 218 | 338 | 2,450 | | | | | 4,610 | 6.27 | | 1,310 | 1,140 | 67 | 15 | 7,800 | 7.2 |

a Field estimate.