EFFECTS OF OCTOBER 1981 FLOOD ON THE QUANTITY AND QUALITY OF WATER IN SELECTED STREAMS AND RESERVOIRS IN THE BRAZOS RIVER BASIN, TEXAS

By Frank C. Wells, Terry L. Schertz, and Marvin W. Flugrath

U.S. GEOLOGICAL SURVEY

Water Resources Investigations Report 84-4055

Prepared in cooperation with the
BRAZOS RIVER AUTHORITY and the
WEST CENTRAL TEXAS MUNICIPAL WATER DISTRICT

Austin, Texas

1984

UNITED STATES DEPARTMENT OF THE INTERIOR

WILLIAM P. CLARK, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

District Chief
U.S. Geological Survey
300 East 8th Street
Austin, Texas 78701

Copies of this report can be purchased from:

Open-File Services Section
Western Distribution Branch
U.S. Geological Survey
Box 25425, Federal Center
Denver, Colorado 80225
Telephone: (303) 234-5888

CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS--Continued

TABLES

TABLES--Continued

TABLES--Continued

METRIC CONVERSIONS

The inch-pound units of measurements used in this report may be converted to metric units by using the following conversion factors:

Multiply	By	To obtain
acre-foot	0.001233	cubic hectometer (hm^3)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
foot	0.3048	meter (m)
inch	25.40	millimeter (mm)
mile	1.609	kilometer (km)
ton (short, 2,000 pounds)	0.9072	megagram (Mg)

To convert temperature in degree celsius (°C) to degree Fahrenheit (°F), multiply by 9/5 and add 32.

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called mean sea level.

EFFECTS OF OCTOBER 1981 FLOOD ON THE QUANTITY AND QUALITY OF WATER IN SELECTED STREAMS AND RESERVOIRS IN THE BRAZOS RIVER BASIN, TEXAS

By

Frank C. Wells, Terry L. Schertz, and Marvin W. Flugrath

ABSTRACT

The storm that moved across north-central Texas during October 11-13, 1981, produced intense rainfall along a line extending from east of Abilene, Texas to Breckenridge, Texas to north of Mineral Wells, Texas. Rainfall in excess of 20 inches was recorded near Clyde, Texas and in several locations near Breckenridge, Texas.

The large quantity of rainfall in the Hubbard Creek drainage basin caused the water level in Hubbard Creek Reservoir to rise by 13.33 feet and the storage contents of the reservoir to increase from 233,000 to 441,000 acre-feet during 56 hours.

Large quantities of inflow into Possum Kingdom Lake from the Brazos River, Big Cedar Creek basin, and ungaged inflow from the Big Caddo Creek basin, and Rock Creek basin caused the water level to rise 7.54 feet and the storage contents to increase from 505,000 to 653,000 acre-feet during 48 hours.

A record peak discharge of 96,600 cubic feet per second was recorded at the gaging station Brazos River near Dennis, Texas on October 14. The discharge-weighted-average concentration of dissolved solids decreased from 1,630 milligrams per liter on October 6, to 103 milligrams per liter on October 13. The monthly discharge-weighted-average concentration of dissolved solids for October 1981 was 782 milligrams per liter and the monthly dissolved-solids load was 1,143,000 tons.

Little change was noted in the water level of Lake Granbury. Lake Granbury was not designed to detain floodwaters, therefore the floodwaters were allowed to pass through the reservoir.

The peak discharge recorded at the gaging station Brazos River near Glen Rose, Texas was 86,400 cubic feet per second on October 15. Water flowing past this gaging station flowed into Lake Whitney causing the water level to rise 18.85 feet and the storage contents to increase from 538,000 to 1,050,000 acre-feet during 10 days. The net change in storage contents of 512,000 acre-feet is nearly equal to one-half the 1,098,000 acre-feet recorded at the Brazos River near Glen Rose for the month of October.

The large volume of runoff associated with the floods on the upper Brazos River basin had a pronounced effect on the quality of water in Hubbard Creek Reservoir, Possum Kingdom Lake, Lake Granbury, and Lake Whitney. Data collected from these reservoirs during August 1981 and late October 1981 were

analyzed to determine water-quality conditions in these reservoirs before and after the flood.

Temperature data collected at deep sites on all four reservoirs during the August 1981 water-quality surveys showed that water near the surface was considerably warmer than water near the bottom, a pattern of thermal stratification that is typical of reservoirs in north-central Texas during the summer months. Temperature data collected during the October 1981 water-quality surveys show that water temperatures near the surface of the reservoirs were 10° to 15°C cooler than during August. The reservoirs were fairly well mixed from surface to bottom although some longitudinal variations in temperature were noted in each of the reservoirs.

Dissolved-oxygen data collected at deep sites on the four reservoirs during the August 1981 water-quality survey also showed a stratification pattern. Dissolved-oxygen concentrations near the surface generally were greater than 6.5 milligrams per liter whereas concentrations at depths greater than 50 feet were less than 110 milligram per liter. During the October water-quality survey, dissolved-oxygen concentrations were rather uniform from surface to bottom and only slight longitudinal variations were noted in the reservoirs.

The volume-weighted-average concentrations of dissolved solids decreased by more than 50 percent between the August and October water-quality surveys on Hubbard Creek Reservoir, Possum Kingdom Lake, and Lake Granbury. The volume-weighted-average concentrations of dissolved solids decreased from 570 to 281 milligrams per liter in Hubbard Creek Reservoir, from 1,560 to 665 milligrams per liter in Possum Kingdom Lake and from 1,520 to 750 milligrams per liter in Lake Granbury. Similar decreases were noted in the volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness in each of the reservoirs.

The volume-weighted-average concentration of dissolved solids in Lake Whitney decreased by 15 percent from 1,090 milligrams per liter in August to 927 milligrams per liter in October. Similar decreases were noted in volume-weighted average concentrations of dissolved solids, chloride, sulfate, and hardness. This relatively small decrease in the volume-weighted-average concentrations of these constituents in Lake Whitney is due in part to a large quantity of inflow to the reservoir in June 1981. Lake Whitney also retained a large quantity of the floodwater which entered the reservoir. Rather than replacing the water in the reservoir, the more dilute floodwaters were added to and mixed with the more mineralized water already in the reservoir.

The decreases in volume-weighted-average concentrations can be attributed directly to the inflow of relatively dilute floodwaters into each of the reservoirs. Although it is possible that cooler air and normal fall overturn may have been partly responsible for cooler water and fairly well mixed conditions in the reservoirs, fall overturn would not significantly affect the volume-weighted-average concentrations of dissolved solids, chloride, and hardness.

INTRODUCTION

Storms that produce intense rainfall and subsequent flooding usually result in severe property damage, personal injury, and death. Such a storm

passed through north-central Texas on October 11-14, 1981, and caused flood damages estimated to be about 30 million dollars in Palo Pinto, Parker, Stephens, and Taylor Counties (U.S. Army Corps of Engineers, 1981). Fortunately, personal injury was minimal and no deaths were reported as a result of the storm.

Environmental effects of flooding also may alter the quality of water in the streams, lakes, and reservoirs. This is especially true in areas where the water is highly mineralized. Floodwaters are generally more dilute in mineral content than the water in the streams during base flow conditions. Although the effects of these dilute floodwaters on the quality of streams may be relatively short, the dilute floodwaters that become trapped in lakes or reservoirs can alter the quality of water in those lakes or reservoirs for long periods.

The purpose of this report, which was prepared in cooperation with the Brazos River Authority and the West Central Texas Municipal Water District, is to provide a description of the storm that passed through north-central Texas on October 11-14, 1981 and to describe the effects of the storm and subsequent flooding on water quantity and quality in the Brazos River basin (fig. 1). An additional report on the storm (H. D. Buckner and J. K. Kurklin, 1984) provides a detailed account of the effects of the storm on streamflow and selected water-quality constituents throughout north-central Texas and southeastern Oklahoma.

DESCRIPTION OF THE STORM

The weather pattern which produced the extreme rainfall over north-central Texas and southern Oklahoma, October 11-13, 1981, began on October 10. At this time, a weak stationary front had established itself along a line through Del Rio, Austin, and Beaumont. At the 850-millibar level, or 5,000 feet above the NGVD of 1929 an area of high pressure was situated over the central Gulf of Mexico providing a clockwise flow of moist Gulf of Mexico air into Texas. A subtropical jetstream was quite persistent during the storm, extending from the southern tip of the Baja Peninsula in Mexico through New Mexico then curving eastward across Kansas. The jet stream was important in three ways: (1) It provided a continuous flow of mid- and upper-level tropical moisture into Texas and Oklahoma; (2) it provided the steering mechanism for the remnants of Hurricane Norma; and (3) it provided additional dynamics that were favorable for intense precipitation.

At sunrise on October 11, the storm front was positioned along a line from San Antonio to Palacios. During the day, it became a warm front and moved northward to a line from Abilene to Beaumont by sunset. The air mass had become increasingly unstable during the day. As an upper-level trough of low pressure began moving eastward into West Texas, intense thunderstorms developed and moved east through West Texas into north-central Texas by nightfall. Most of these storms were located north of the warm front due to the additional lift provided by the frontal boundary As of 7:00 a.m. c.d.t. on October 12, rainfall totaled 2 to 7 inches within an area bound by Abilene, Denton, and Seymour. The location of the storm in north-central Texas and southern Oklahoma at 5:00 a.m. c.d.t. on October 12 is shown in figure 2.

By the afternoon of October 12, 1981, the warm front over central Texas became diffuse. As this occurred, it allowed dew-point temperatures to

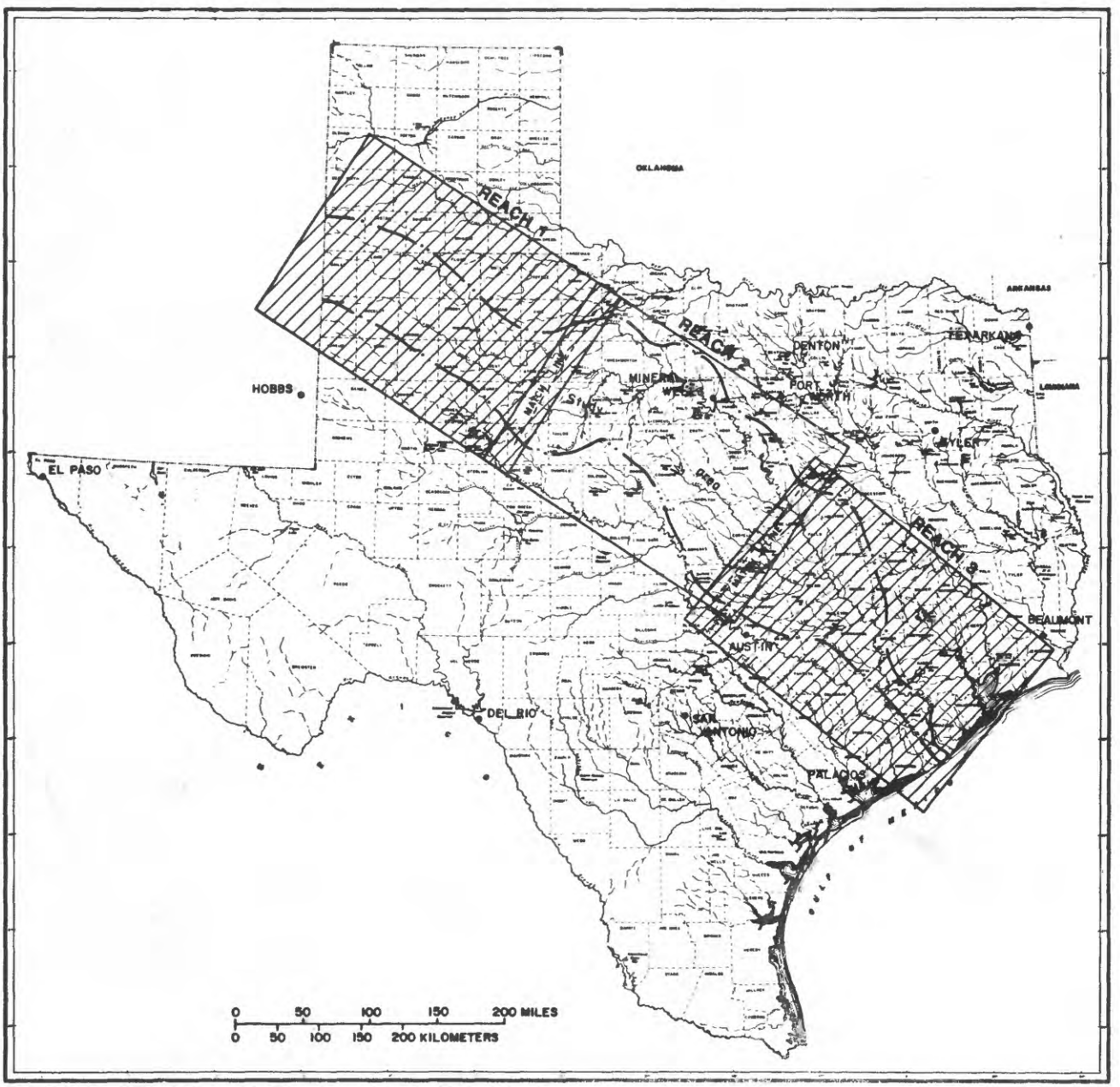

Figure 1a.–Location of the study area showing the upper, central, and lower Brazos River basin in Texas

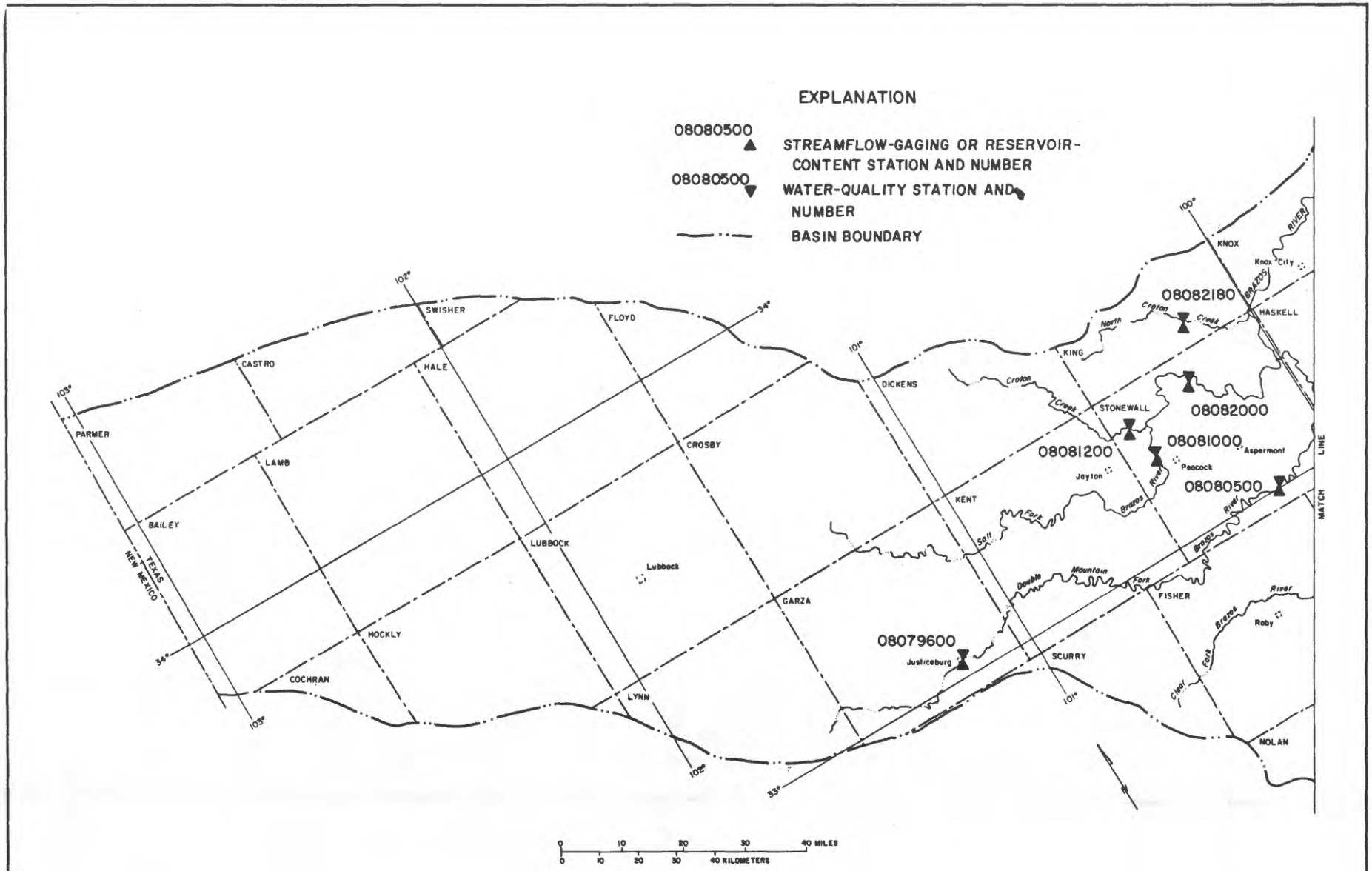

Figure 1b.-Location of streamflow-gaging or reservoir-content stations and water-quality stations in the Upper Brazos River basin

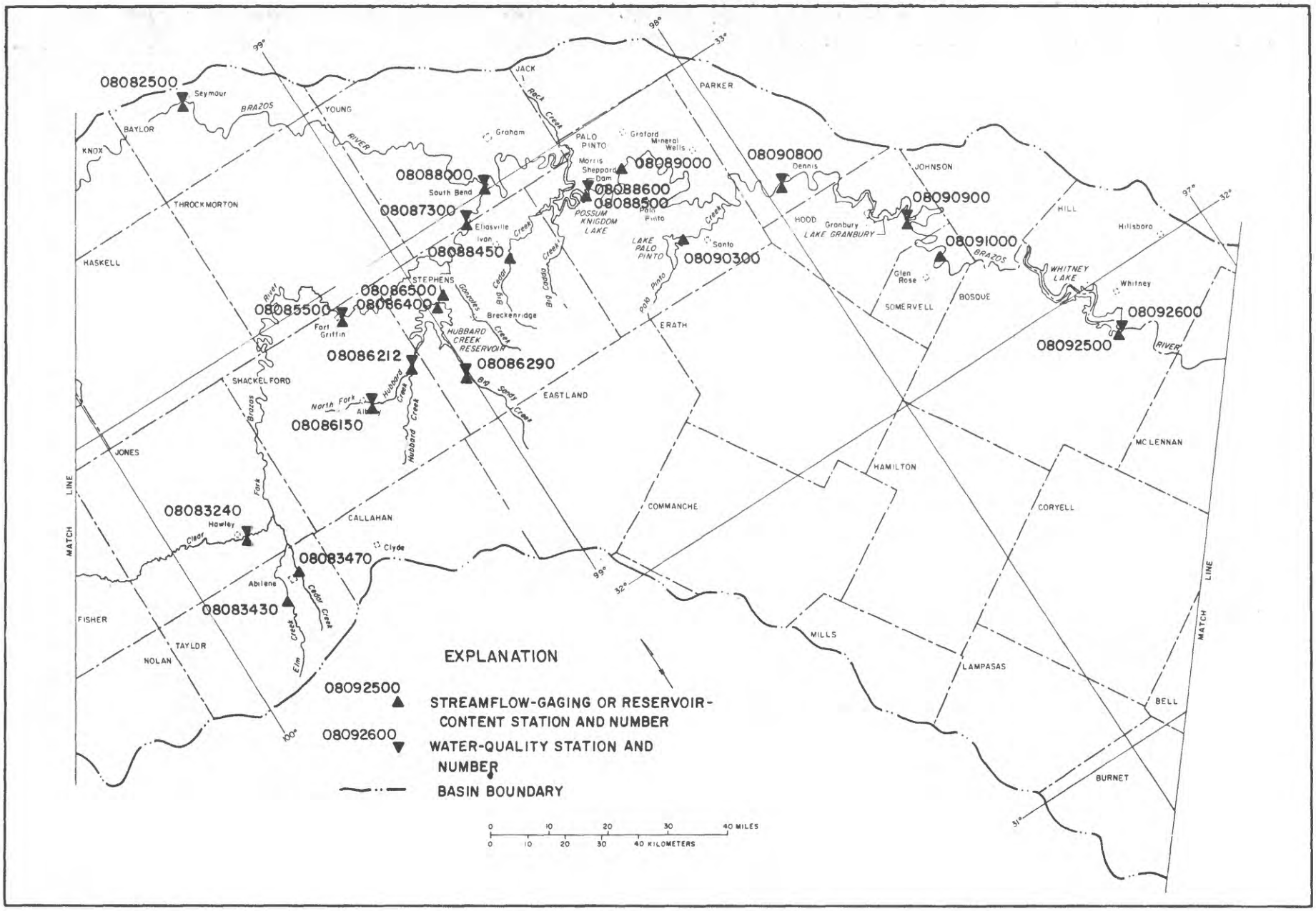

Figure 1c.-Location of streamflow-gaging or reservoir-content stations and water-quality stations in the Central Brazos River basin

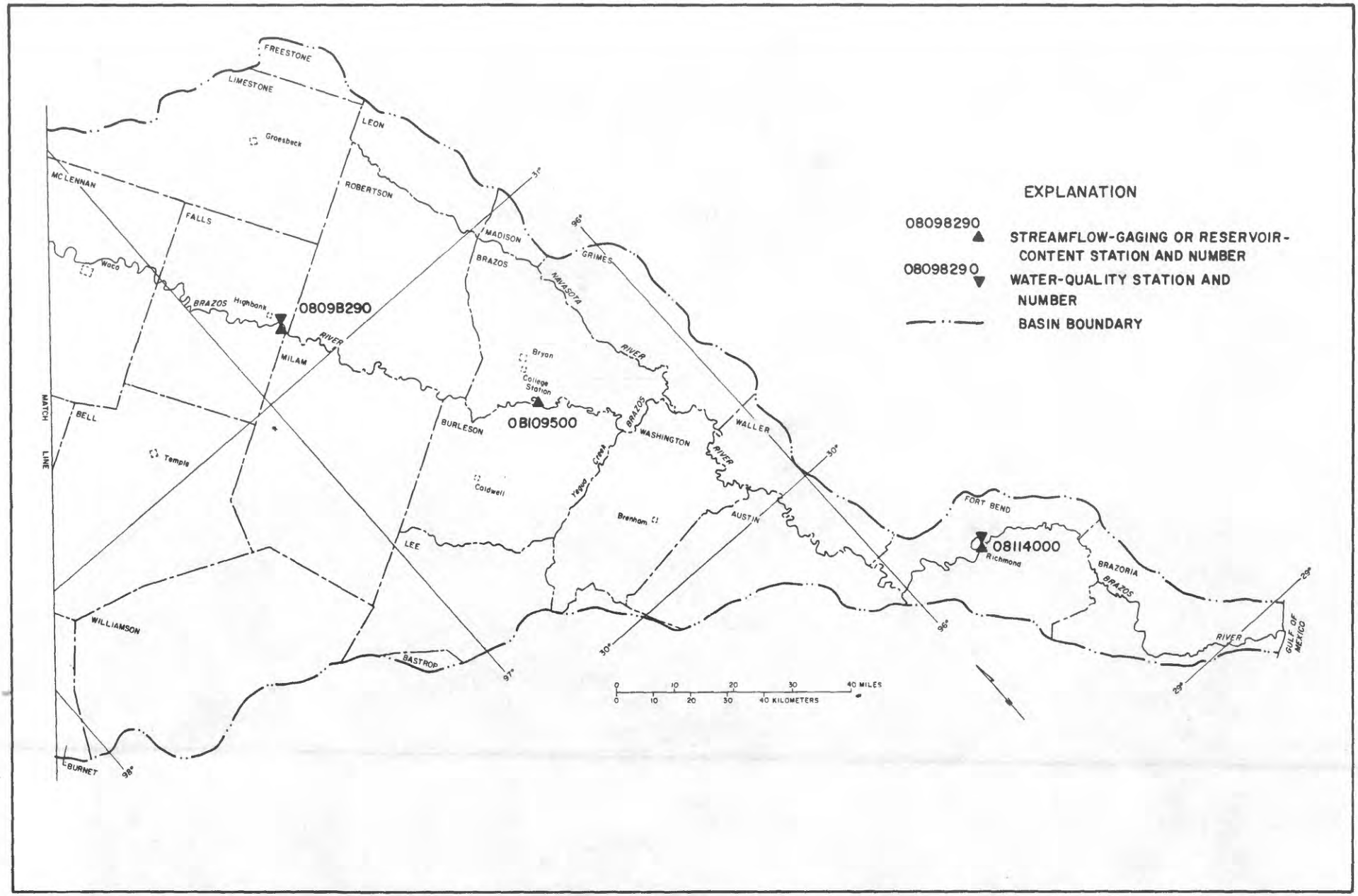

Figure 1d.-Location of streamflow-gaging or reservoir-content stations and water-quality stations in the Lower Brazos River basin

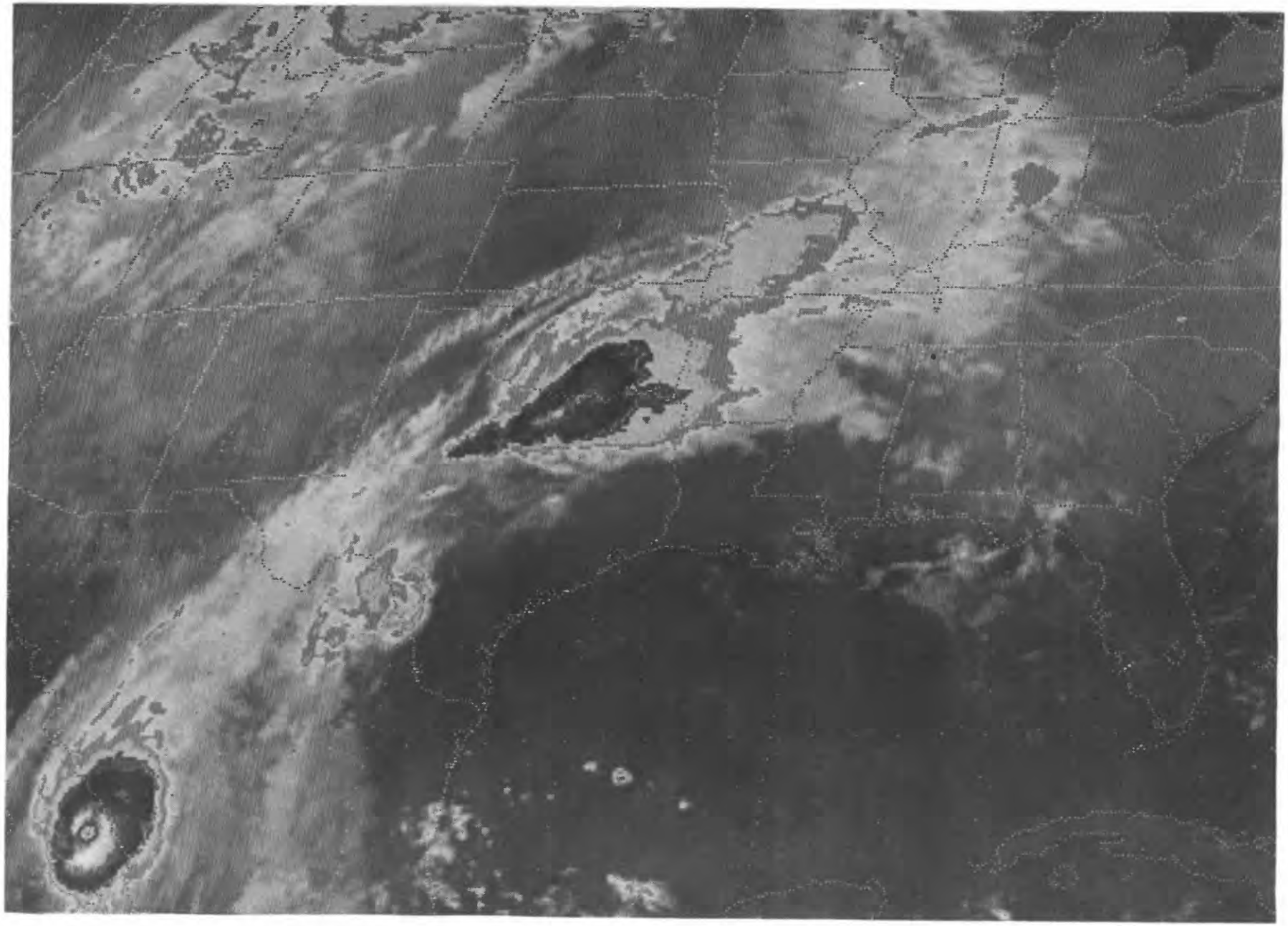

Figure 2.--Infrared imagery of storm system located over north-central Texas and southern Oklahoma at 5:00 a.m., c.d.t., October 12, 1981

increase to more than 70°C. Not only were greater quantities of moisture available for additional precipitation, but the air mass became increasingly unstable. In addition, a thunderstorm outflow boundary was easily identifiable on satellite imagery extending from Texarkana to Tyler to Fort Worth to near Mineral Wells. As the outflow boundary merged with the diffuse warm front, a weak upper-level disturbance formed near El Paso and moved to a line between Hobbs, New Mexico and Del Rio by the early morning of October 13. The position of the storm in north-central Texas and southern Oklahoma at 1:30 a.m. c.d.t. on October 13, 1981 is shown in figure 3. The existing meteorological conditions described above produced rains of 10 to 16 inches.

Thunderstorms and intense rain continued over north Texas during the morning of October 13. Late in the morning, the combined effects of the upper-level disturbance and remains of Hurricane Norma caused a few severe thunderstorms accompanied by tornadoes. The entire system moved northeast during the afternoon and evening with rain ending by midnight.

The storm produced intense rainfall in the Brazos River basin along either side of a line extending from just east of Abilene to Breckenridge, to north of Mineral Wells, Texas (fig. 4). More than 20 inches of rainfall were recorded near Clyde in Callahan County, and at several locations in Stephens County near Breckenridge. These intense rains caused water-surface elevations in many of the reservoirs to rise rapidly.

HYDROLOGIC EFFECTS OF STORM RUNOFF ON STREAMFLOW, RESERVOIR CONTENT, AND WATER QUALITY

Floods not only affect the quantity of water in a stream or reservoir, but also the quality of that water. The solute or dissolved-solids concentration in a stream usually is inversely related to discharge. During base-flow conditions, the water conveyed by a stream usually is ground water that infiltrates into the river, and the dissolved-solids concentrations generally are large. During and soon after rainfall, runoff enters the drainage system and causes an increase in discharge. Because the runoff from precipitation usually has a smaller dissolved-solids concentration than that of the streams, the runoff has a diluting effect on the dissolved-solids concentration of a stream. Consequently, runoff entering a stream results in an increase in discharge and a decrease in dissolved solids concentrations. An example is shown in figure 5.

This relation may not be true immediately downstream from large reservoirs. Releases from a reservoir represent the quality of water within the reservoir at the point of withdrawal. Increasing the quantity of water released from the reservoir does not necessarily alter the quality of the water immediately. Because reservoirs represent large volumes of water in storage, large inflows may be required to appreciably alter the quality of water within or released from a reservoir. Consequently, several days may elapse before the quality of the water withdrawn from a reservoir reflects the changes in water-quality from large inflows. An example is shown in figure 6.

Although increased discharge resulting from flood inflows may cause concentrations of dissolved solids and individual solutes to decrease, the solute loads (expressed in tons per day) generally increase as discharge

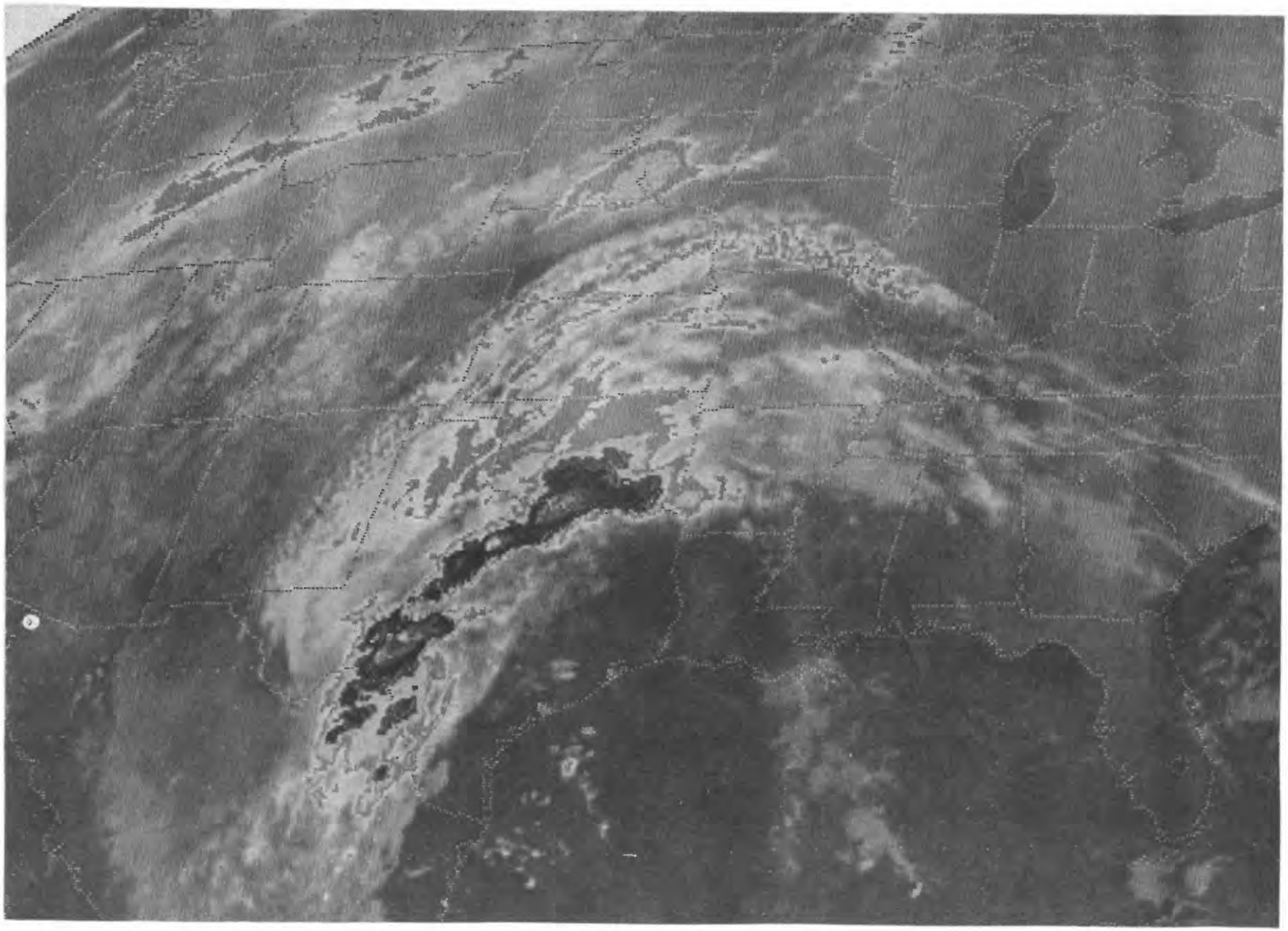

Figure 3.--Infrared imagery of storm system located over north-central Texas and southern Oklahoma at 1:30 a.m., c.d.t., October 13, 1981

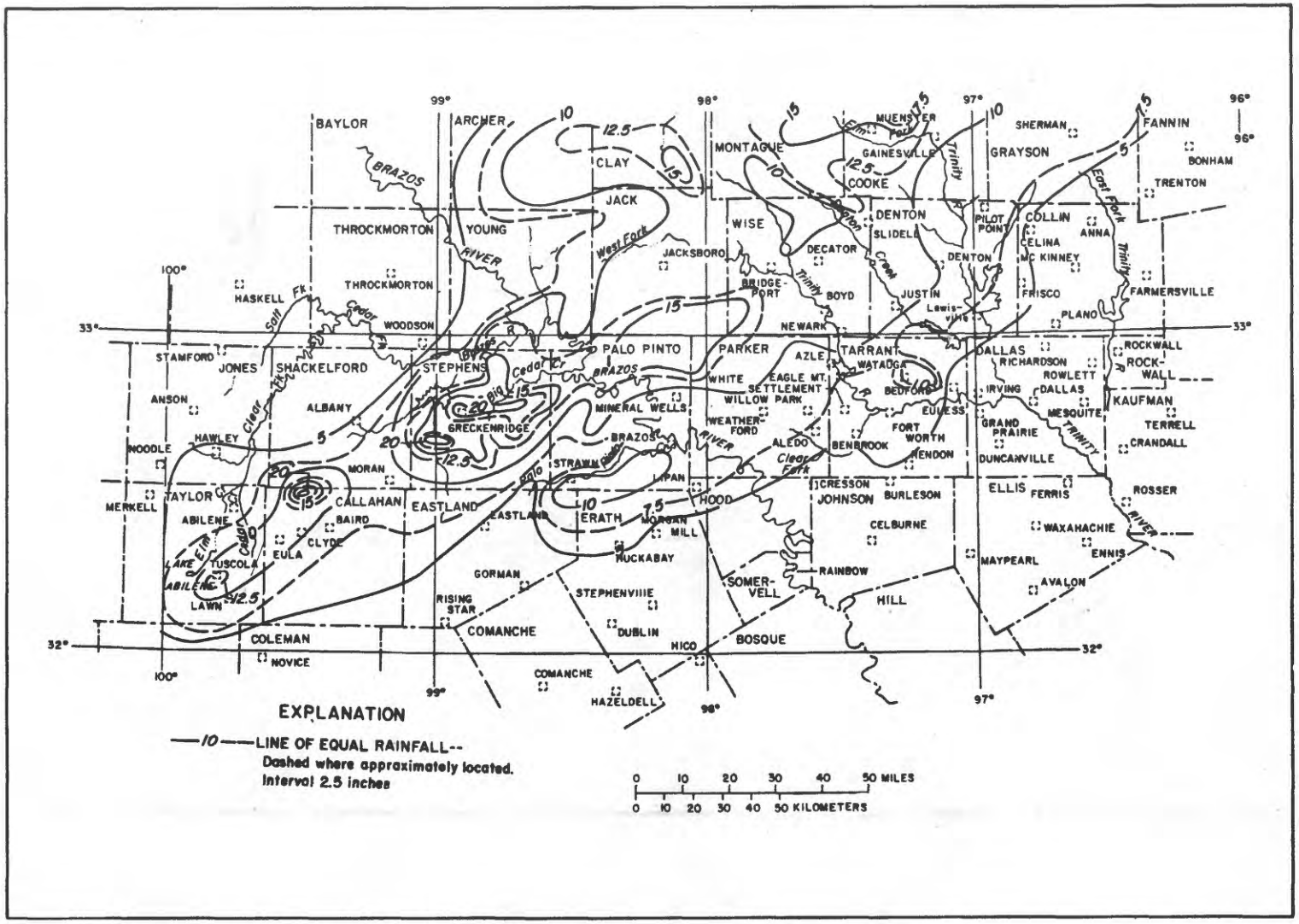

Figure 4.–Rainfall accumulations in north central Texas, October 11–13, 1981

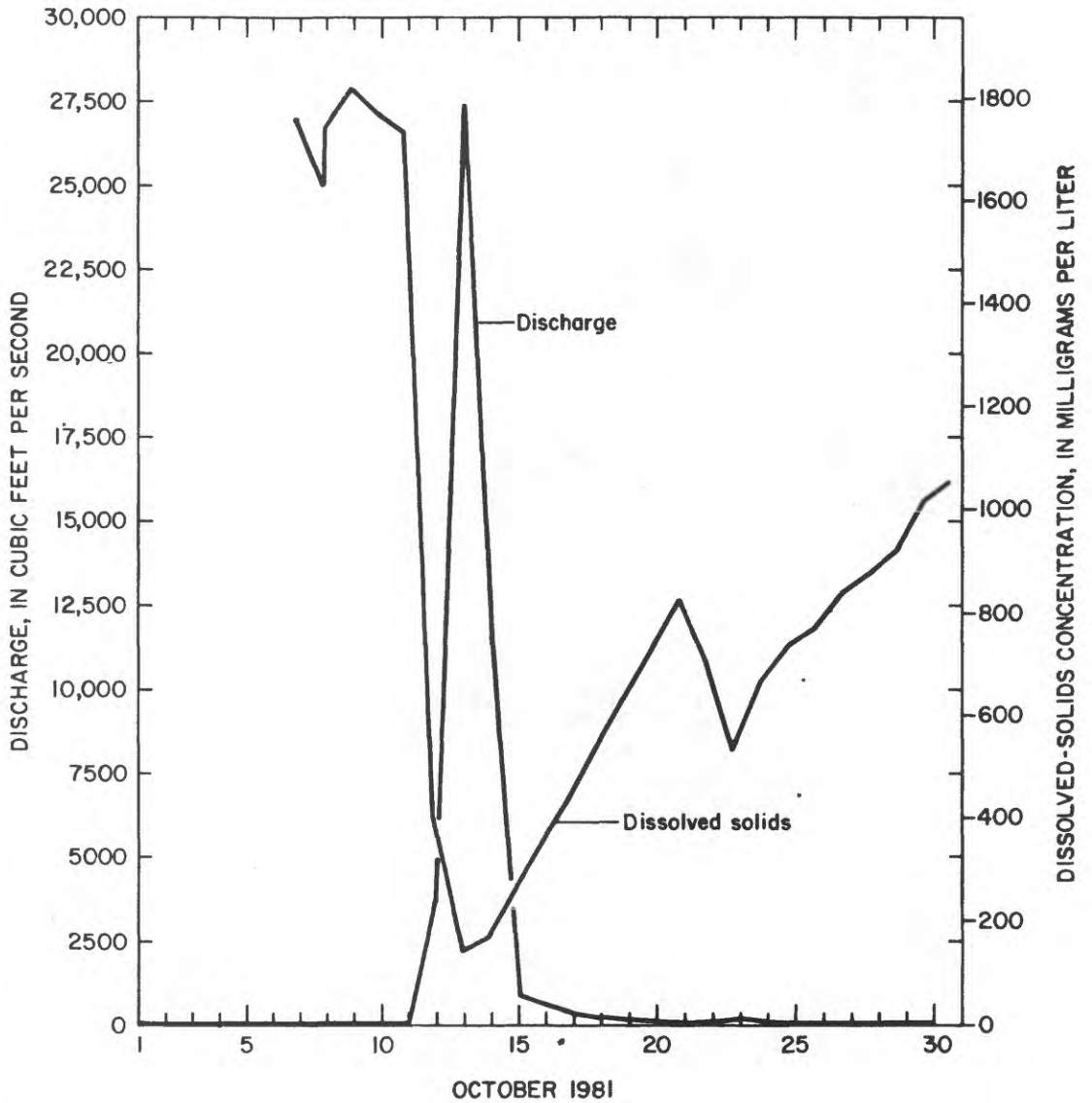

Figure 5.-Daily mean discharges and discharge-weighted-average dissolved-solids concentrations for Hubbard Creek below Albany, Texas (08086212), October 1981

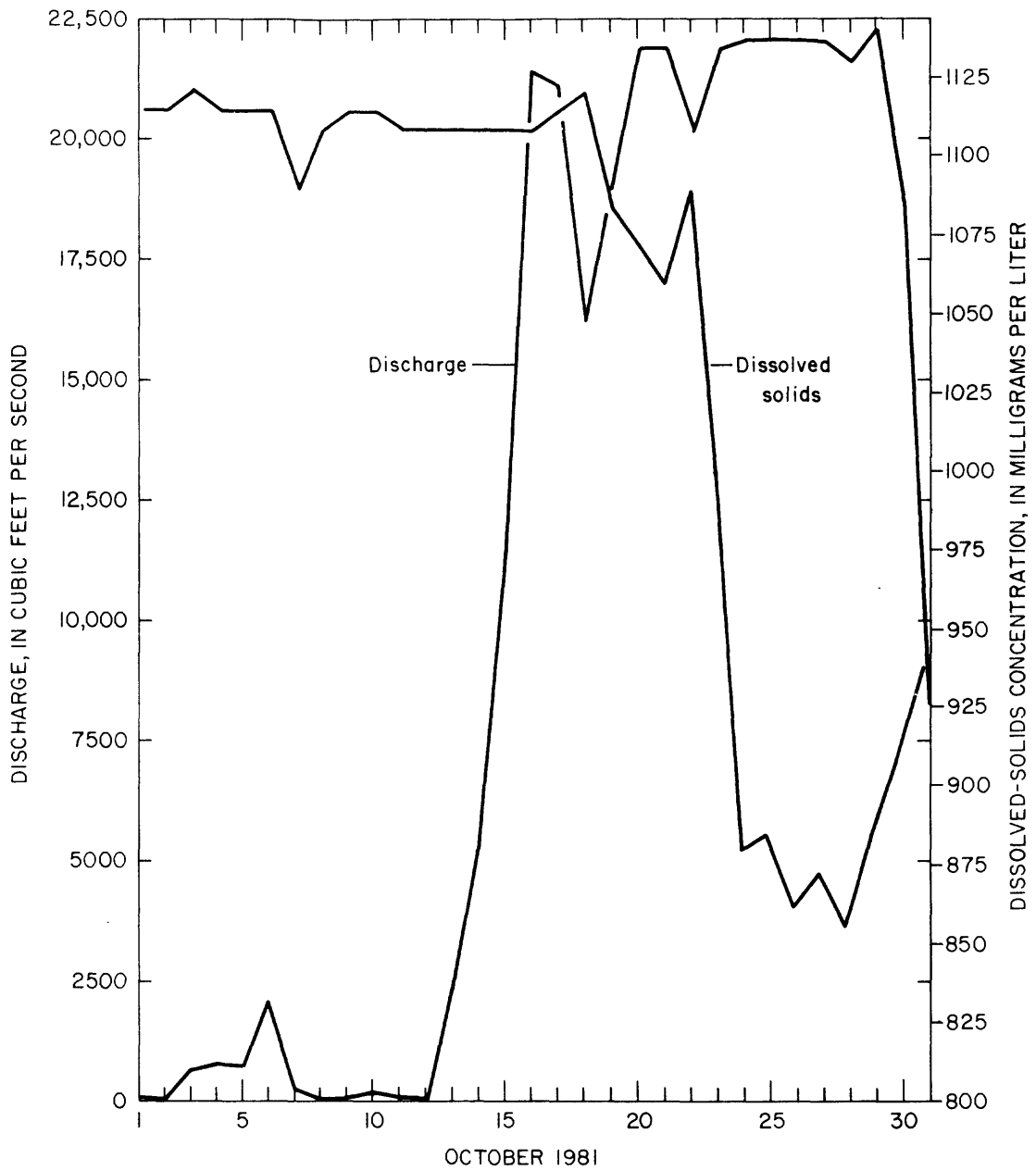

Figure 6.-Daily mean discharges and discharge-weighted-average dissolved-solids concentrations for Brazos River at Whitney Dam near Whitney, Texas (08092600), October 1981

increases. Loads are a function of both concentration and discharge and may be computed using the formula:

$$\text{loads} = 0.0027QC \quad (1)$$

where loads are in tons per day;
Q = discharge, in cubic feet per second; and
C = concentration, in milligrams per liter.

Daily and monthly mean concentrations and daily and monthly loads for October 1981 have been computed or estimated for selected streamflow stations where daily mean discharge and once daily or daily mean specific-conductance data are available. These data are presented in tables 1 to 20 at the end of the report.

Double Mountain Fork Brazos River and Salt Fork Brazos River

The effects of the storm runoff on discharge and water quality in streams west of Abilene generally were less pronounced than those east of Abilene. Rainfall west of Abilene during the storm generally was less than 5 inches (fig. 4). Daily mean discharges in the Double Mountain Fork Brazos River near Aspermont (08080500) during October 1-6 did not exceed 11 ft^3/s and daily discharge-weighted-average dissolved-solids concentrations ranged from 3,680 to 5,430 mg/L milligrams per liter (figure 7 and table 2). The maximum dissolved-solids load during this period was 161 tons per day. During the storm, October 11-13, the maximum mean daily discharge was 4,810 ft^3/s and the minimum daily discharge-weighted-average dissolved-solids concentration was 650 mg/L, both occurring on October 13. The maximum dissolved-solids load of 8,440 tons per day for the month of also occurred on October 13.

Daily mean discharges in the Salt Fork Brazos River near Aspermont (08082000) station during October 1-6, did not exceed 2.0 ft^3/s and daily-discharge-weighted average dissolved-solids concentrations ranged from 23,400 to 39,900 mg/L (fig. 7 and table 5). The maximum dissolved-solids load during this period was 119 tons per day. During the storm, October 11-13, the maximum mean daily discharge was 3,950 ft^3/s and the minimum-daily discharge-weighted-average dissolved-solid concentration was 1,890 mg/L, both occurring on October 13. The maximum dissolved-solids load of 20,900 tons per day also occurred on October 12.

Clear Fork Brazos River and Tributaries

Daily mean discharges in the Clear Fork Brazos River at Hawley, Texas (08083240), during October 1-12 did not exceed 40 ft^3/s and daily discharge-weighted-average dissolved-solids concentrations ranged from 1,840 to 3,850 mg/L (fig. 8 and table 8). Daily dissolved-solids loads during this period ranged from 110 to 300 tons per day. After the storm, the maximum daily mean discharge was 719 ft^3/s and the minimum daily discharge weighted average dissolved-solids concentration was 582 mg/L, both occurring on October 14. The maximum daily dissolved-solids load of 1,130 tons for the month also occurred on October 14.

The storm had a more pronounced effect on tributaries to the Clear Fork Brazos River in the vicinity of Abilene, Texas. Record peak discharges of

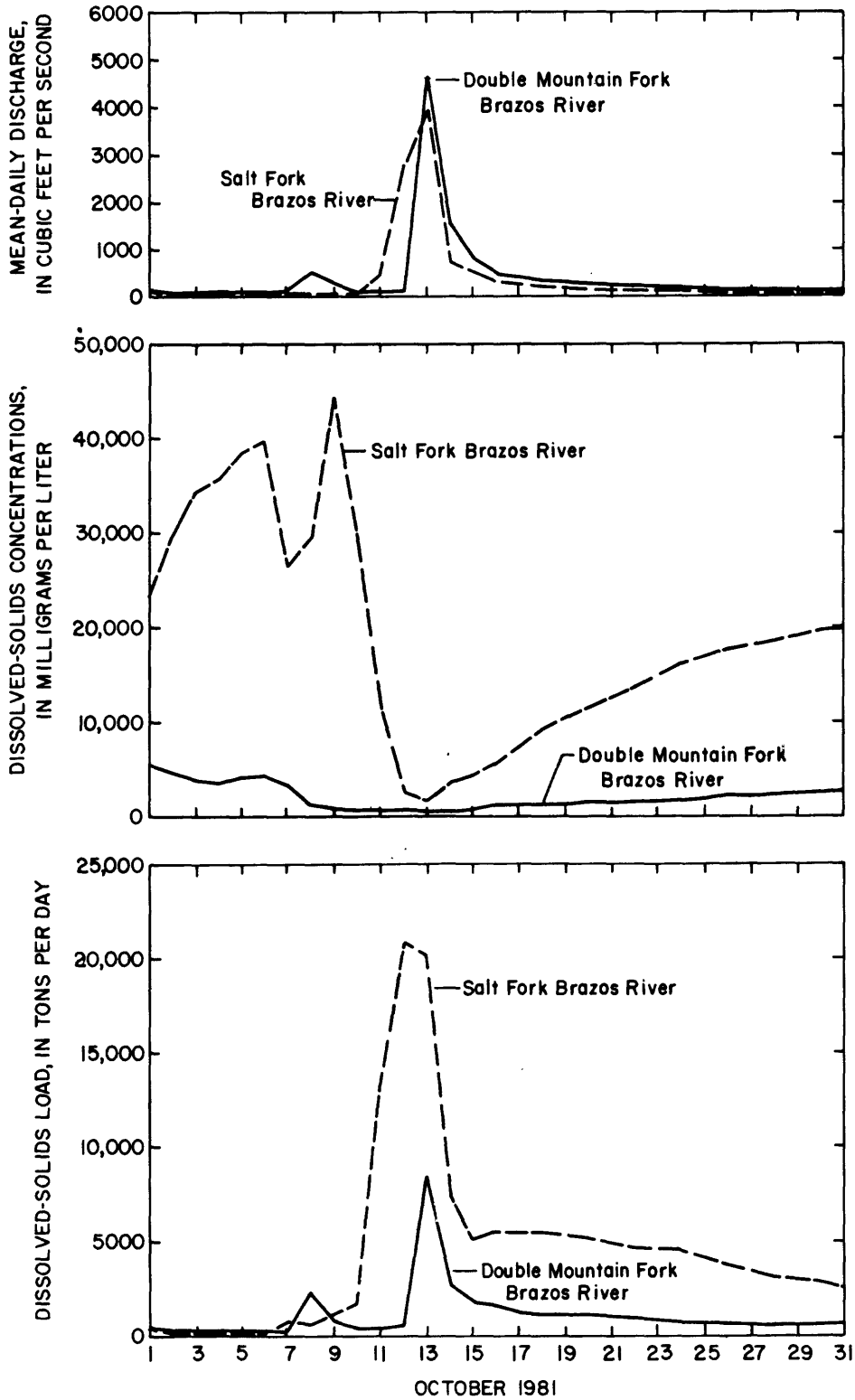

Figure 7.–Variations in mean daily discharge and dissolved-solids concentrations and loads for Double Mountain Fork Brazos River near Aspermont, Texas (08080500), and Salt Fork Brazos River near Aspermont, Texas (08082000), October 1981

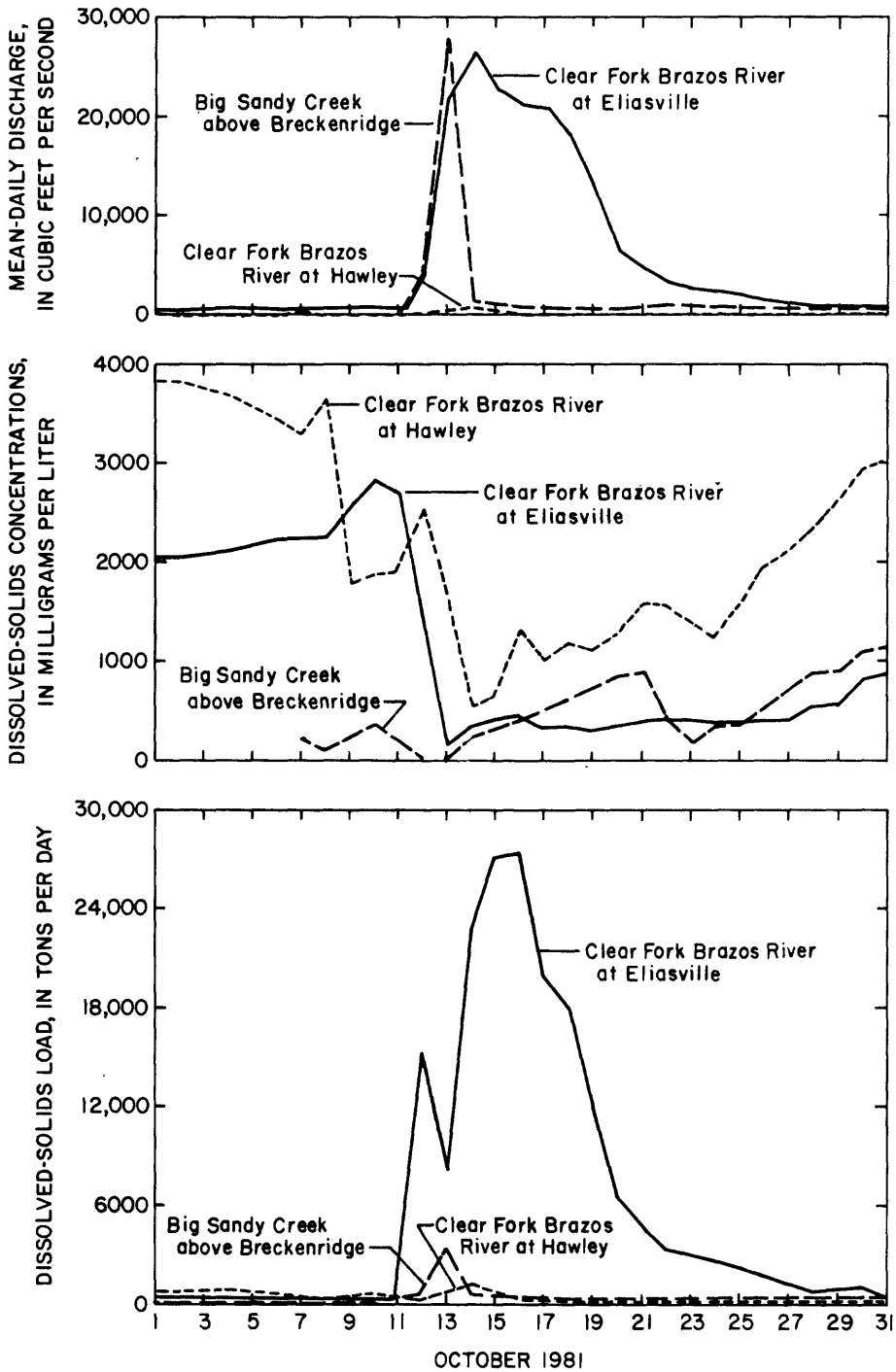

Figure 8.–Variations in mean daily discharge and dissolved-solids concentrations and loads for Clear Fork Brazos River at Hawley, Texas (08083240), Big Sandy Creek above Breckenridge Texas (08086290), and Clear Fork Brazos River at Eliasville Texas (08087300), October 1981

5,020 and 18,500 ft^3/s were recorded on Elm Creek at Abilene, Texas (08083430) and on Cedar Creek at Abilene, Texas (08083470), respectively. Prior to the storm, the mean daily discharge in Elm Creek had not exceeded 216 ft^3/s and the mean daily discharge in Cedar Creek had not exceeded 51 ft^3/s. Water-quality data are not available for these stations for October 1981.

The storm had a pronounced effect on discharge and water quality in the Hubbard Creek and Gonzales Creek drainage basins. No flow was recorded in Big Sandy Creek above Breckenridge (08086290), during October 1-6 (fig. 8 and table 12). Rainfall on October 7 caused the mean daily discharge to increase to 182 ft^3/s on October 7. Discharges decreased following this rain and just prior to the storm, no flow was recorded in Big Sandy Creek on October 11. Daily discharge-weighted-average dissolved-solids concentrations ranged from 120 to 394 mg/L during October 7-10. The intense rainfall produced by the storm resulted in a record peak discharge of 80,000 ft^3/s on October 13. The minimum daily discharge-weighted-average dissolved-solids concentration in Big Sandy Creek during the month was 49 mg/L and the maximum dissolved-solids load was 3,750 tons per day, both occurring on October 13, during periods of high discharge.

The maximum discharge of 55,600 ft^3/s was determined by an indirect discharge measurement (at Gonzales Creek near Breckenridge). Continuous-discharge records and water-quality data are not available for Gonzales Creek.

Discharges at the gaging stations North Fork Hubbard Creek near Albany (08086150) and Hubbard Creek below Albany (08086212) were not as pronounced as those in Big Sandy Creek. Daily mean discharges at these gaging stations did not exceed 5 ft^3/s during October 1-11. Daily discharge-weighted-average dissolved-solids concentrations during this same period ranged from 2,610 to 2,710 mg/L in North Fork Hubbard Creek (table 10) and from 1,730 to 1,990 mg/L in Hubbard Creek (table 11). During the storm, the peak discharge recorded in North Fork Hubbard Creek near Albany was 364 ft^3/s on October 13 and the daily minimum discharge-weighted-average dissolved-solids concentration was 908 mg/L on October 14. On October 13 the peak discharge recorded on Hubbard Creek below Albany was 36,100 ft^3/s and the daily minimum discharge-weighted-average dissolved-solids concentration was 144 mg/L.

The tremendous quantity of rainfall in the Hubbard Creek drainage basin upstream from Hubbard Creek Reservoir had a pronounced effect on the quantity and quality of water in Hubbard Creek Reservoir. During 56 hours between 2:00 a.m. on October 12, and 10:00 a.m. on October 14, the water level in Hubbard Creek Reservoir rose 13.33 feet and the contents of the reservoir increased from 233,000 to 441,000 acre-feet (fig. 9). This represents the largest volume of water ever recorded in Hubbard Creek Reservoir. A detailed discussion of the effects of the large inflow to the reservoir on the water quality in Hubbard Creek Reservoir is presented in the section "Effects of flood on water quality in selected reservoirs".

Hubbard Creek Reservoir attenuated the magnitude of the flood on Hubbard Creek downstream from the reservoir. The peak discharge recorded at the gaging station Hubbard Creek near Breckenridge, Texas (08086500), which is 1.4 miles downstream from the reservoir was 16,200 ft^3/s on October 13, 1981.

Downstream from Hubbard Creek, the peak discharge recorded at the gaging

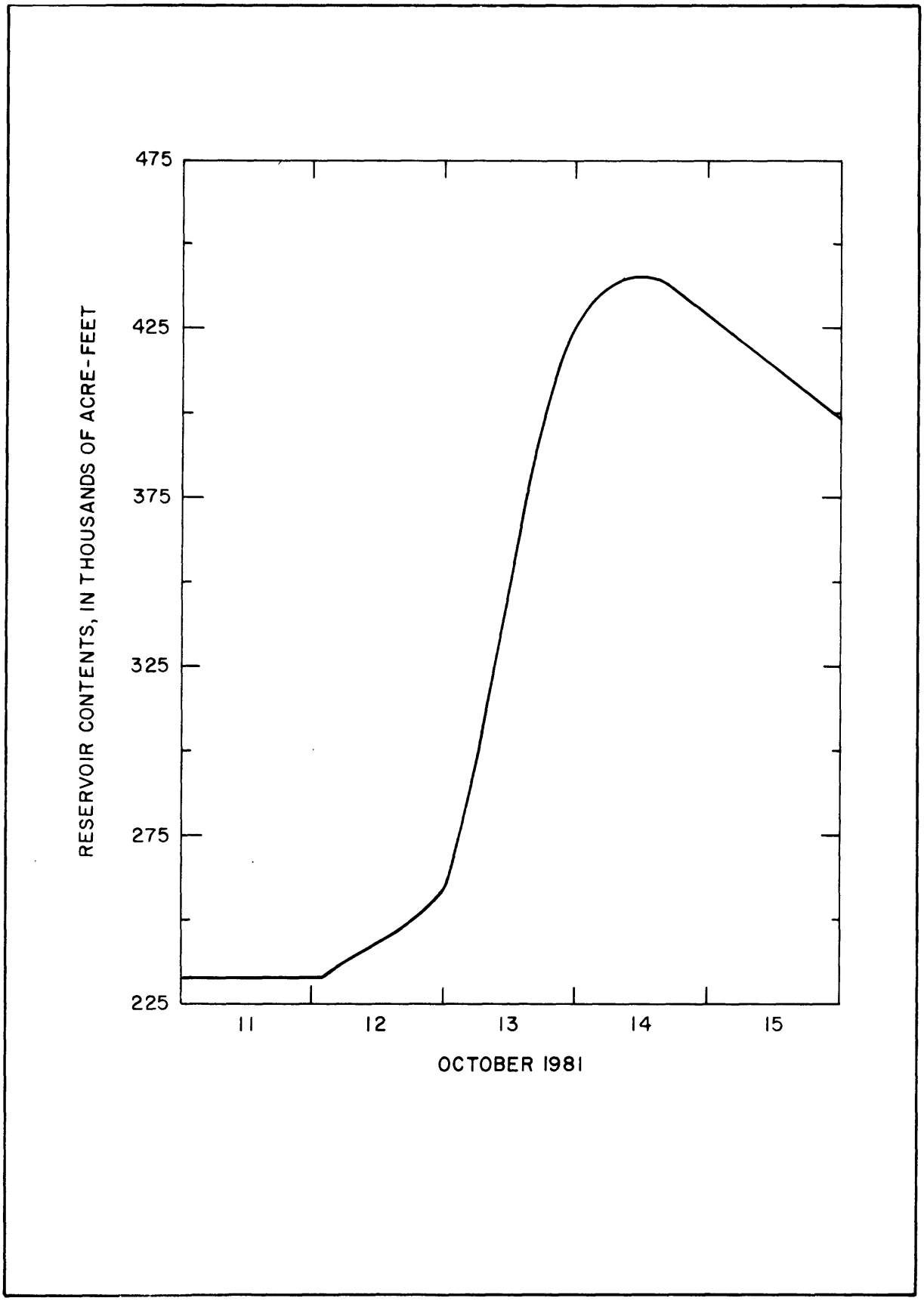

Figure 9.-Reservoir-contents hydrograph for Hubbard Creek Reservoir near Breckenridge, Texas (08086400), October 11-15, 1981

station Clear Fork Brazos River at Eliasville, Texas (08087300) was 26,900 ft^3/s on October 14, 1981, the daily minimum dicharge-weighted-average dissolved-solids concentration was 128 mg/L on October 13, 1981 and the maximum dissolved solids load was 28,400 tons per day on October 16, 1981 (fig. 8 and table 13).

Main Stem Brazos River and Tributaries from South Bend to Whitney Dam

The storm also had a pronounced effect on the quantity and quality of water in Possum Kingdom Lake. The water level in Possum Kingdom Lake rose by 7.54 feet and the storage contents increased from 505,000 to 653,000 acre-feet during 48-hours 6:00 p.m. on October 11 to 6:00 p.m. October 13 (fig. 10). Much of the initial increase can be attributed to large inflows from the Big Cedar Creek drainage basin and from ungaged inflow in the Big Caddo Creek basin, Rock Creek basin, and the intervening drainage area on the Brazos River between the gage on Brazos River at South Bend (08088000), and the gage on Possum Kingdom Lake at Morris Sheppard Dam (08088500). Rainfall in these areas ranged from 10 to 20 inches (fig. 4) and resulted in a substantial increase in discharge at the gaging station Big Cedar Creek near Ivan, Texas (08088450).

Discharge at this gaging station began to increase on October 12 and the initial peak of 10,700 ft^3/s occurred at 1:00 p.m. on the same day (fig. 11). Additional rains caused another increase in discharge shortly before midnight on October 12 and resulted in a record peak discharge of 34,700 ft^3/s at 9:45 a.m. on October 13. The maximum storage contents in Possum Kingdom Lake of 653,000 acre-feet occurred approximately 10 hours after the second peak. High flows were not sustained on Big Cedar Creek and by midnight of October 13 the discharge had decreased to less than 5,000 ft^3/s. Although water-quality data for Big Cedar Creek are not available for the flood concentrations of dissolved solids were probably similar in magnitude to those in Big Sandy Creek, or less than 100 mg/L during high flow.

Although much of the initial increase of storage contents in Possum Kingdom Lake can be attributed mostly to local inflow, the Brazos River contributed large quantities of water to the reservoir after the storm. Discharge at the gaging station Brazos River near South Bend, Texas (08088000) did not begin to increase until approximately 6:00 a.m. on October 12, and the maximum mean-daily discharge of 39,100 ft^3/s was recorded on October 15 (fig. 12 and table 14). Although the maximum mean-daily discharge in the Brazos River near South Bend was not much greater than that recorded on Big Cedar Creek near Ivan, the duration of high flows into Possum Kingdom Lake from the Brazos River was much longer. Discharges in the Brazos River near South Bend remained greater than 20,000 ft^3/s through October 18 and did not decrease to less than 10,000 ft^3/s until October 20. During the October 1981, 467,000 acre-feet of water was recorded at this gaging station, which is more than 90 percent of the 505,000 acre-feet of water in Possum Kingdom Lake prior to the flood.

Although daily water-quality sampling was discontinued at Brazos River near South Bend prior to the flood, past records were used to estimate discharge-weighted-average concentrations and loads of selected constituents for October 1981 (table 14). Using linear regression analysis between discharge and specific conductance and estimating dissolved-solids concentrations from values of specific conductance, the daily minimum discharge-

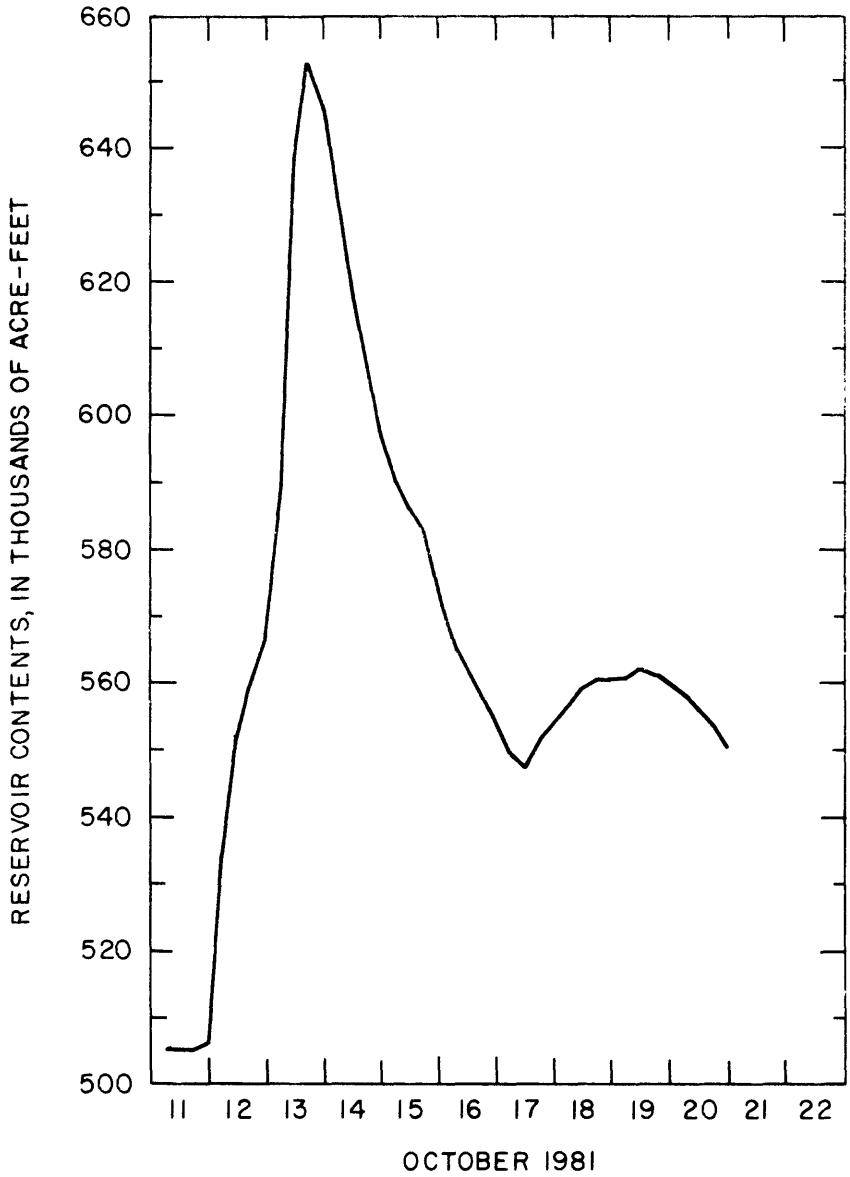

Figure 10.-Reservoir-contents hydrograph for Possum Kingdom Lake near Graford, Texas (08088500), October 11-20, 1981

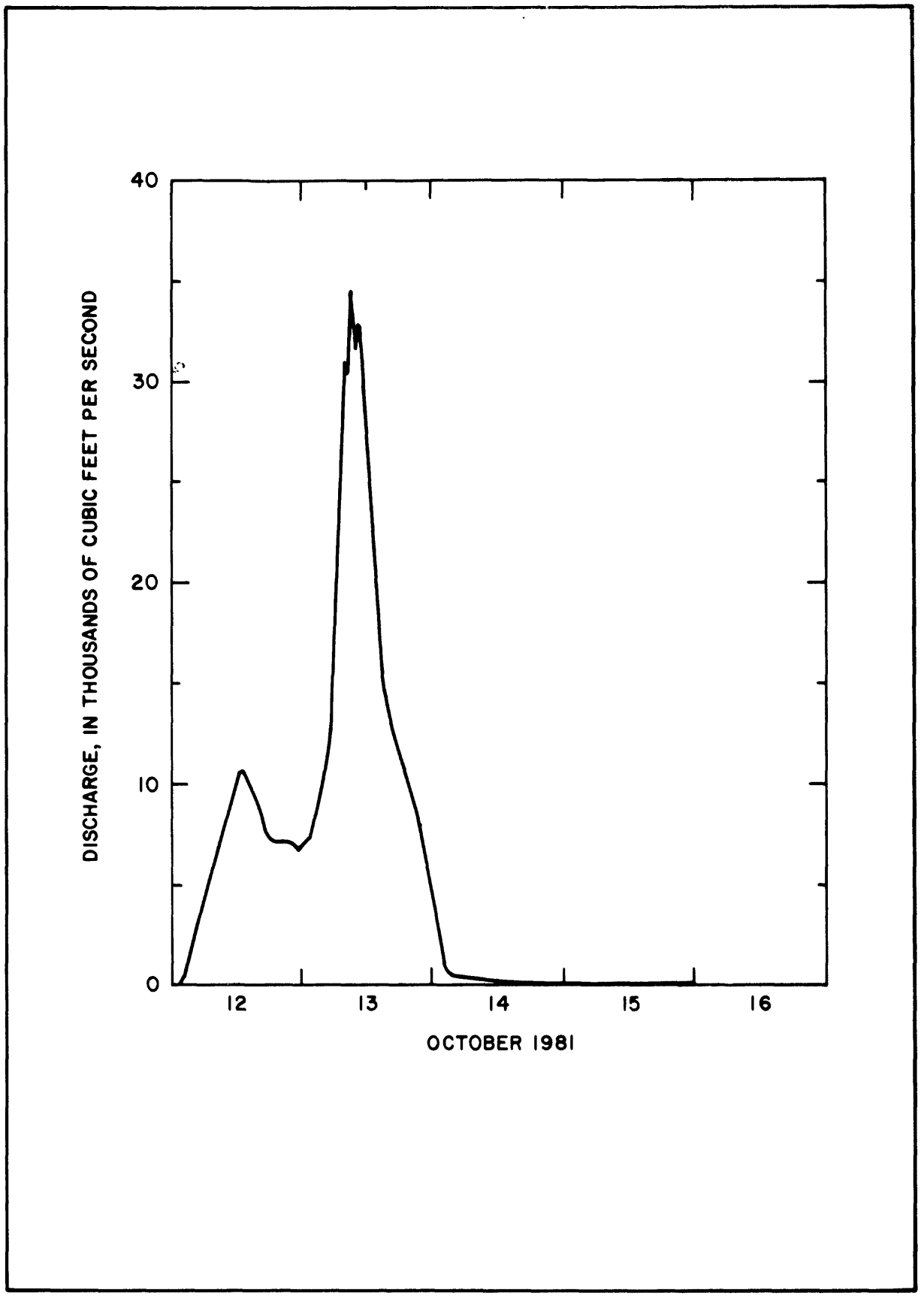

Figure 11.-Discharge hydrograph for Big Cedar Creek near Ivan, Texas (08088450), October 12-15, 1981

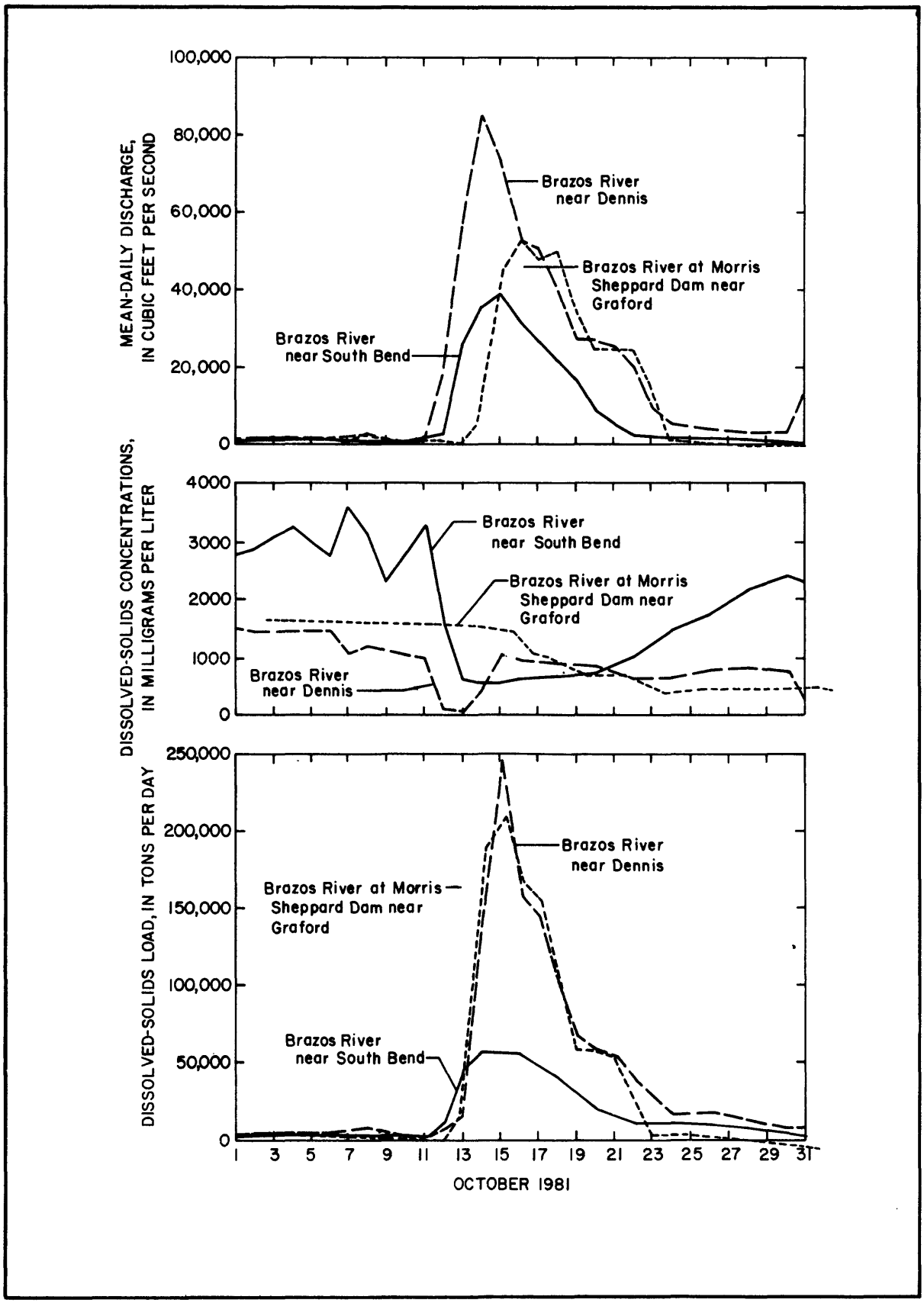

Figure 12.–Variations in mean daily discharge and dissolved-solids concentrations and loads for Brazos River near South Bend, Texas (08088000), Brazos River at Morris Sheppard Dam near Graford, Texas (08088500), and Brazos River near Dennis, Texas (08090800), October 1981

weighted-average concentration of dissolved solids was estimated to be 532 mg/L on October 15, and the daily maximum dissolved-solids load was estimated to be 58,000 tons per day on October 14. The discharge-weighted-average concentration of dissolved solids for October 1981 was estimated to be 738 mg/L and the dissolved-solids load for the month was estimated to be 470,000 tons.

These estimates compare reasonably well with the volume-weighted-average concentration of dissolved solids measured in Possum Kingdom Lake near the end of October. On October 28, the volume-weighted-average dissolved-solids concentration was 665 mg/L or about 70 mg/L less than the estimated discharge-weighted-average concentration from the Brazos River near South Bend during October. A detailed description of the effects of the flood on the water quality in Possum Kingdom Lake is given in the section, "Effects of flood on water quality in selected reservoirs."

Release of water from Possum Kingdom Lake began on October 12 soon after inflow into the reservoir began. The maximum daily mean discharge from Morris Sheppard Dam of 54,400 ft^3/s (107,900 acre-feet) and the maximum dissolved-solids load of 214,000 tons per day occurred on October 14 (fig. 12 and table 15). The minimum daily discharge weighted-average dissolved-solids concentration of 669 mg/L did not occur until October 22. These data indicate that from the time flood inflow began entering the reservoir on October 11, eleven days elapsed before the maximum effects of the inflow on the quality of water released from the reservoir were recorded. Mean daily discharges from the dam remained greater than 20,000 ft^3/s through October 20. These releases along with additional inflow to the Brazos River resulted in flooding along the Brazos River downstream from Possum Kingdom Lake. The peak discharge recorded at the gaging station Brazos River near Palo Pinto, Texas (08089000) was 68,600 ft^3/s on October 13. Further downstream, the peak discharge recorded at the gaging station Brazos River near Dennis (08090800) was 96,600 ft^3/s. The large increase in discharge at the two stations can be attributed to inflow from the Palo Pinto Creek drainage basin. Approximately 10 inches of rain fell in the Palo Pinto Creek drainage basin south of Palo Pinto Reservoir (0809300).

Although no discharge or water-quality data are available from the Palo Pinto Creek drainage basin for October 1981, data collected at the gaging station Lake Palo Pinto near Santo, Texas (08090300) show that the storage contents in the reservoir increased from 26,450 acre-feet at 10:00 a.m on October 11 to 52,500 acre-feet at 10:00 a.m. on October 12. Limited historical water-quality data collected in Lake Palo Pinto indicate that dissolved-solids concentrations in the reservoir generally are less than 500 mg/L. During and after the flood it is reasonable to assume that dissolved-solids concentrations in water released from the reservoir were significantly less than 500 mg/L.

Discharge in the Brazos River near Dennis (08090800) began to increase during the early morning hours of October 12 (fig. 12 and table 16). Prior to the increase, the discharge was less than 100 ft^3/s. By midnight the discharge had increased to 46,200 ft^3/s, and the maximum discharge of record of 96,600 ft^3/s was recorded at 6:00 p.m. on October 14. Flows at this station remained greater than 20,000 ft^3/s through October 22, and by the end of the month, 541,200 ft^3/s-days (1,074,000 acre-feet) of water was recorded at this station.

The discharge-weighted-average dissolved-solids concentration in the Brazos River near Dennis at the beginning of the month was in excess of 1,600 mg/L. A small increase in discharge recorded at the gaging station on October 6-8 caused the discharge-weighted-average dissolved-solids concentration to decrease to approximately 1,000 mg/L. The daily minimum discharge-weighted-average concentration of dissolved solids was 103 mg/L on October 13. The maximum daily dissolved-solids load of 245,000 tons occurred on October 15, after the discharge had decreased slightly and the daily discharge-weighted-average dissolved-solids concentrations had increased to slightly more than 1,200 mg/L. The monthly discharge-weighted-average concentration of dissolved solids for October 1981 was 782 mg/L and the monthly dissolved-solids load was 1,143,000 tons.

The large volume of water that flowed past the gaging station at Brazos River near Dennis flowed into Lake Granbury. Lake Granbury was built by the Brazos River Authority for the conservation of water for irrigation, and for municipal and industrial uses. The intended purpose of the reservoir was not to detain floodwaters; therefore, the floodwaters were allowed to pass through the reservoir and resulted in relatively little change in water-surface elevation and storage contents (fig. 13). Water was released from the reservoir before the floodwaters arrived to prevent a large rise in the water surface elevation. The water level of Lake Granbury at noon on October 11 was 692.58 feet above NGVD of 1929. The water level rose to a maximum of 692.60 feet above NGVD of 1929 at 6:00 p.m. on October 12 (a change of only 0.02 foot) and the storage contents of the reservoir remained less than 140,000 acre-feet from October 14 through October 20, 1981.

Although the water level and storage contents of Lake Granbury were not affected by the flood, a pronounced change was noted in the quality of water in the reservoir after the flood. The volume-weighted-average concentration of dissolved solids decreased from 1,520 mg/L on August 6, to 750 mg/L on October 29. This concentration is slightly less than the October monthly discharge-weighted-average dissolved-solids concentration of 782 mg/L recorded for the Brazos River at Dennis, Texas. A detailed description of the effects of the flood on the water quality of Lake Granbury is given in the section, "Effects of floods on water-quality in selected reservoirs."

Discharge at the gaging station Brazos River near Glen Rose, Texas (08091000), approximately 31 miles downstream from Lake Granbury, began to increase on October 12, (fig. 14). The peak discharge of 86,400 ft^3/s was recorded on October 15. Discharges remained greater than 40,000 ft^3/s until October 19 and greater than 20,000 ft^3/s until October 23. By the end of the month, 553,700 ft^3/s-days (1,098,000 acre-feet) of water passed this station. Water-quality data are not available for this station during the storm.

Flood flows on the Brazos River near Glen Rose began to cause an increase in stage and storage contents in Lake Whitney on the morning of October 13 (fig. 15). The water level rose from 529.02 feet above NGVD of 1929 (538,000 acre-feet) to 547.60 feet (1,040,000 acre-feet) on October 19. The peak stage of 547.87 feet (1,050,000) occurred on October 22. The 18.85-feet rise in water level in the reservoir represents a net change in storage contents of 512,000 acre-feet which is nearly one-half the total volume of water that flowed past the gaging station near Glen Rose during October. The effects of

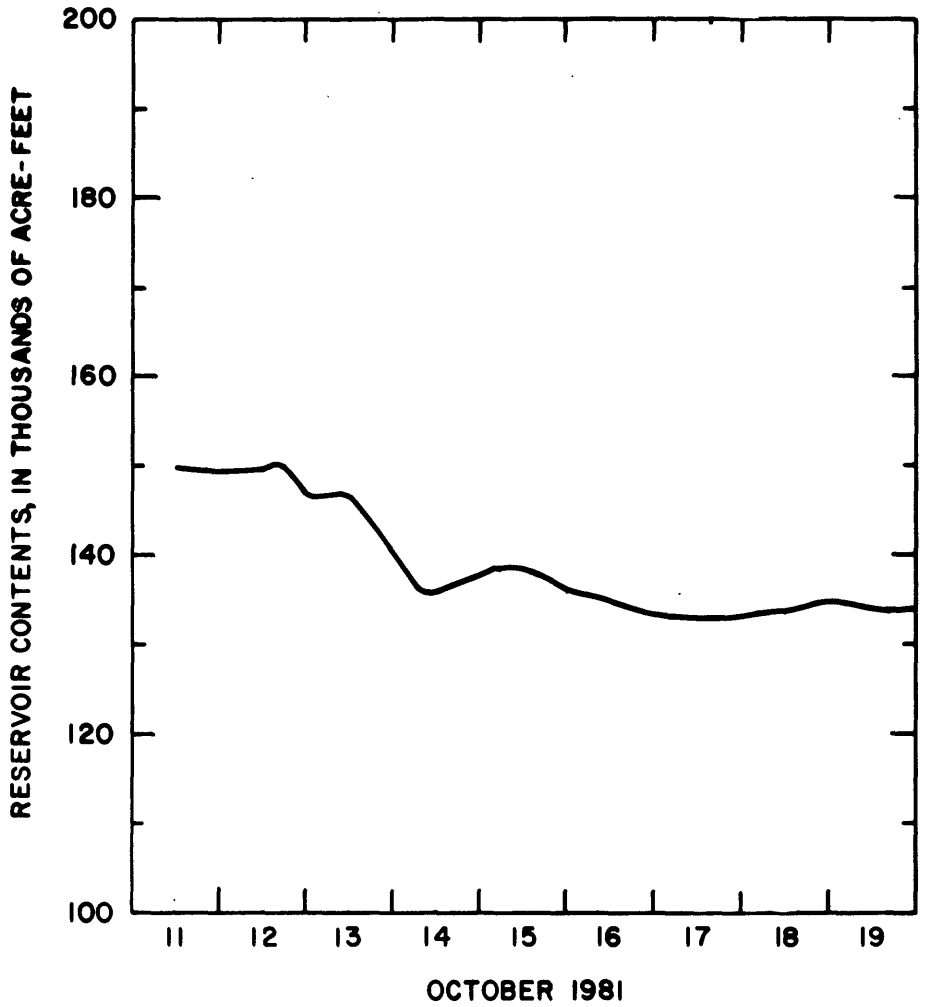

Figure 13.-Reservoir-contents hydrograph for Lake Granbury near Granbury, Texas (08090900), October 11-19, 1981

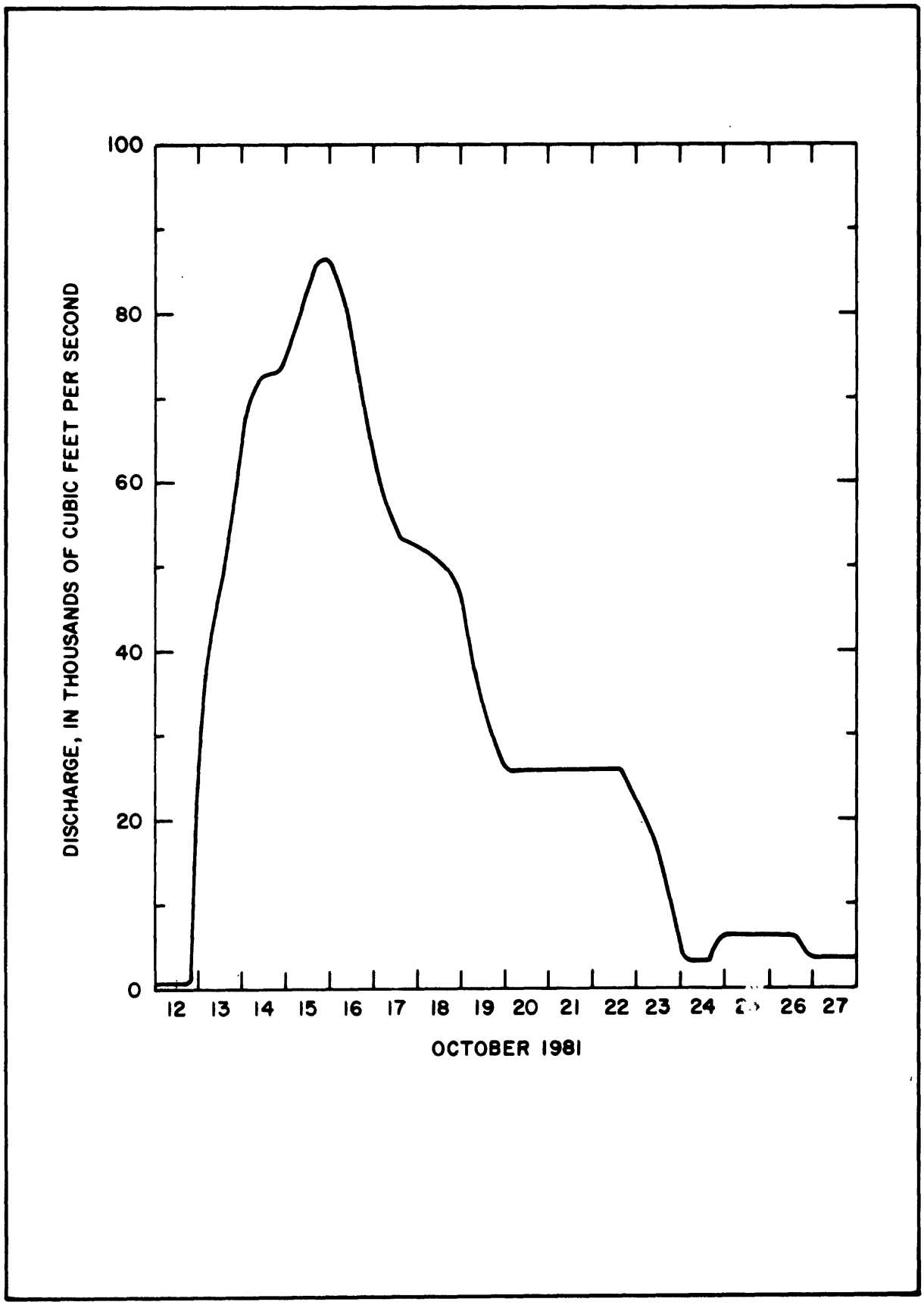

Figure 14.–Discharge hydrograph for Brazos River near Glen Rose, Texas (08091000), October 12–27, 1981

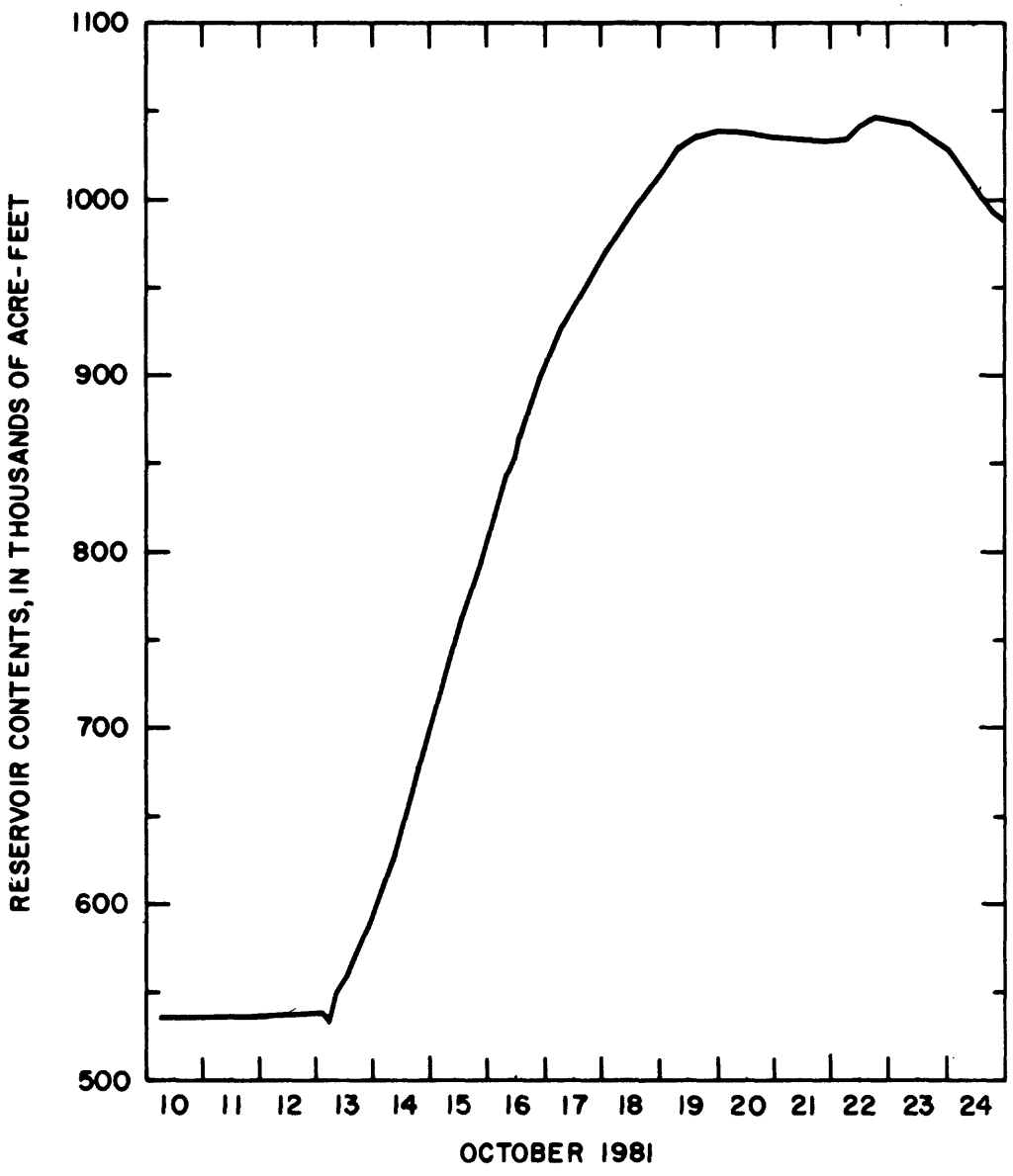

Figure 15.–Reservoir-contents hydrograph for Lake Whitney near Whitney, Texas (08092500), October 10–24, 1981

the large inflow on the water quality in Lake Whitney is given in the section, "Effects of flood on water quality in selected reservoir."

Outflow from Lake Whitney began on October 13. Releases were fairly constant with the daily mean discharge at the gaging station Brazos River at Whitney Dam (08092600) ranging from 16,200 ft^3/s (32,100 acre-feet) to 22,400 ft^3/s (44,400 acre-feet) during October 16-29 (fig. 6 and table 17). By the end of October, only 347,200 ft^3/s-days (688,700 acre-feet) had been released from the reservoir which is 409,300 acre-feet less than that flowing past the gaging station near Glen Rose. These data indicate that a large proportion of the water flowing into the reservoir during the middle of the month remained in the reservoir at the end of the month.

The daily discharge-weighted-average dissolved-solids concentrations of water released from Lake Whitney did not vary significantly during October 16-31. Discharge-weighted-average concentrations of dissolved solids ranged from 856 mg/L on October 28 to 1,110 mg/L on October 16 and 17. Dissolved-solids loads during this same time period ranged from 64,000 tons per day on October 16 to 20,900 tons per day on October 31.

Main Stem Brazos River from Whitney Dam to Mouth

The controlled releases from Lake Whitney attenuated discharges in the Brazos River downstream from the reservoir. Daily mean discharges at the gaging station Brazos River near Highbank, Texas (08098290), Brazos River at College Station, Texas (08109500) and Brazos River at Richmond, Texas (08114000) did not exceed 31,300 ft^3/s during October 14-31.

Smaller variations were noted in the discharge-weighted-average concentrations of dissolved solids in the Brazos River near Highbank than at other stations downstream during October 14-31 (fig. 16 and table 18). Discharge-weighted-average concentrations of dissolved solids at Highbank ranged from 667 mg/L on October 29 to 1,100 mg/L on October 19. Dissolved-solids loads ranged from 22,100 tons per day on October 15 to 79,500 tons per day on October 18.

Discharge-weighted-average concentrations in the Brazos River near College Station, Texas during October 14-31 ranged from 137 mg/L on October 14 to 1,020 mg/L on October 21 (fig. 16 and table 19). Dissolved-solids loads during this period ranged from 3,810 tons per day on October 14 to 71,700 tons per day on October 19 and 23. Discharge-weighted average concentrations of dissolved solids in the Brazos River at Richmond, Texas during October 14-31 ranged from 160 mg/L on October 19 to 844 mg/L on October 24 (fig. 16 and table 20). Dissolved-solids loads ranged from 2,930 tons per day on October 14 to 67,000 tons per day on October 24.

EFFECTS OF FLOOD ON WATER QUALITY IN SELECTED RESERVOIRS

The large volume of runoff associated with the floods in the upper Brazos River basin had a pronounced effect on the quality of water in Hubbard Creek Reservoir (fig. 17), Possum Kingdom Lake (fig. 18), Lake Granbury (fig. 19), and Lake Whitney (fig. 20). Samples collected from these reservoirs during August 1981 and late October 1981 were analyzed to determine the water-quality

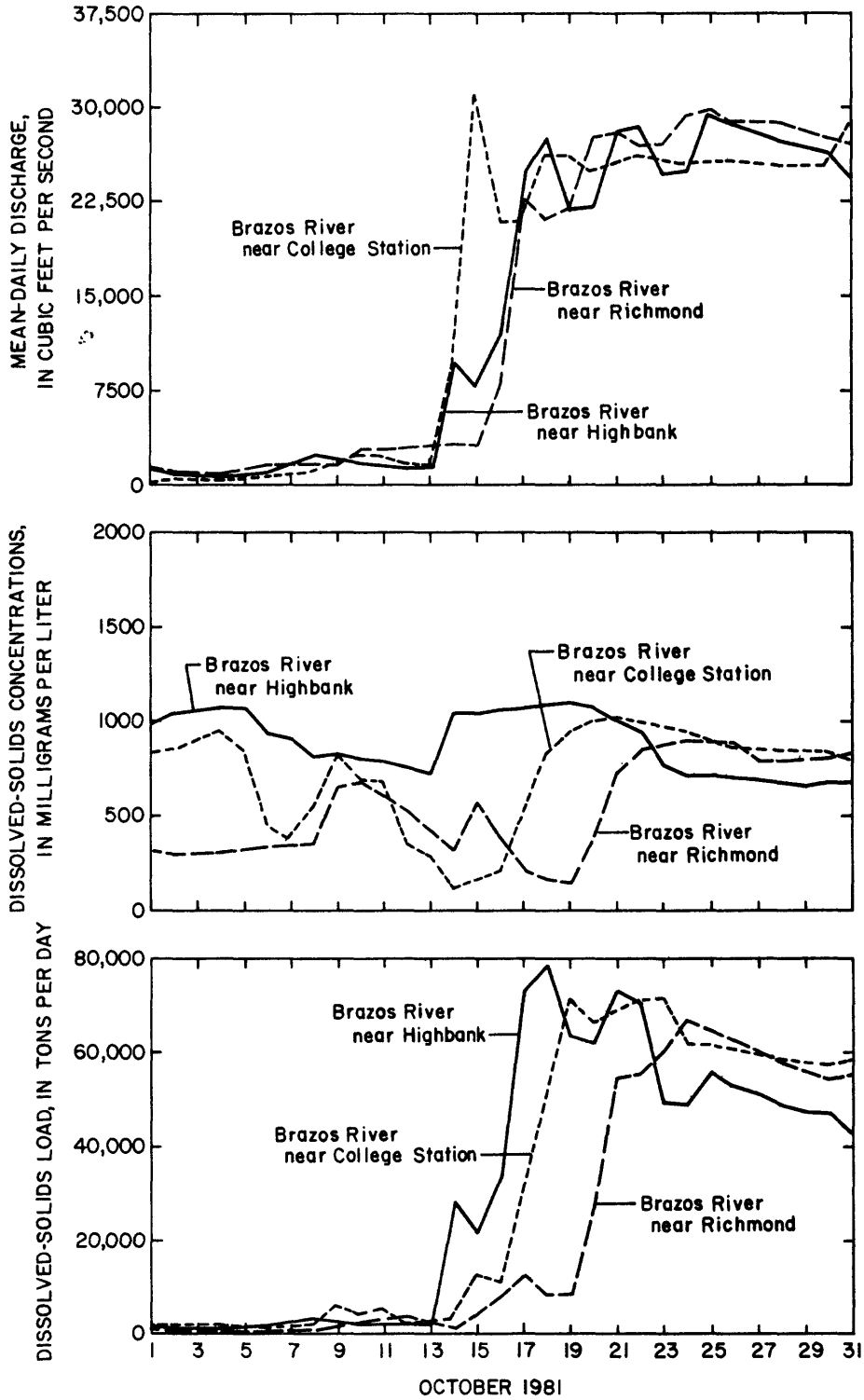

Figure 16.–Variations in mean daily discharge and dissolved-solids concentrations and loads for Brazos River near Highbank, Texas (08098290), Brazos River near College Station, Texas (08109500), and Brazos River near Richmond, Texas (08114000), October 1981

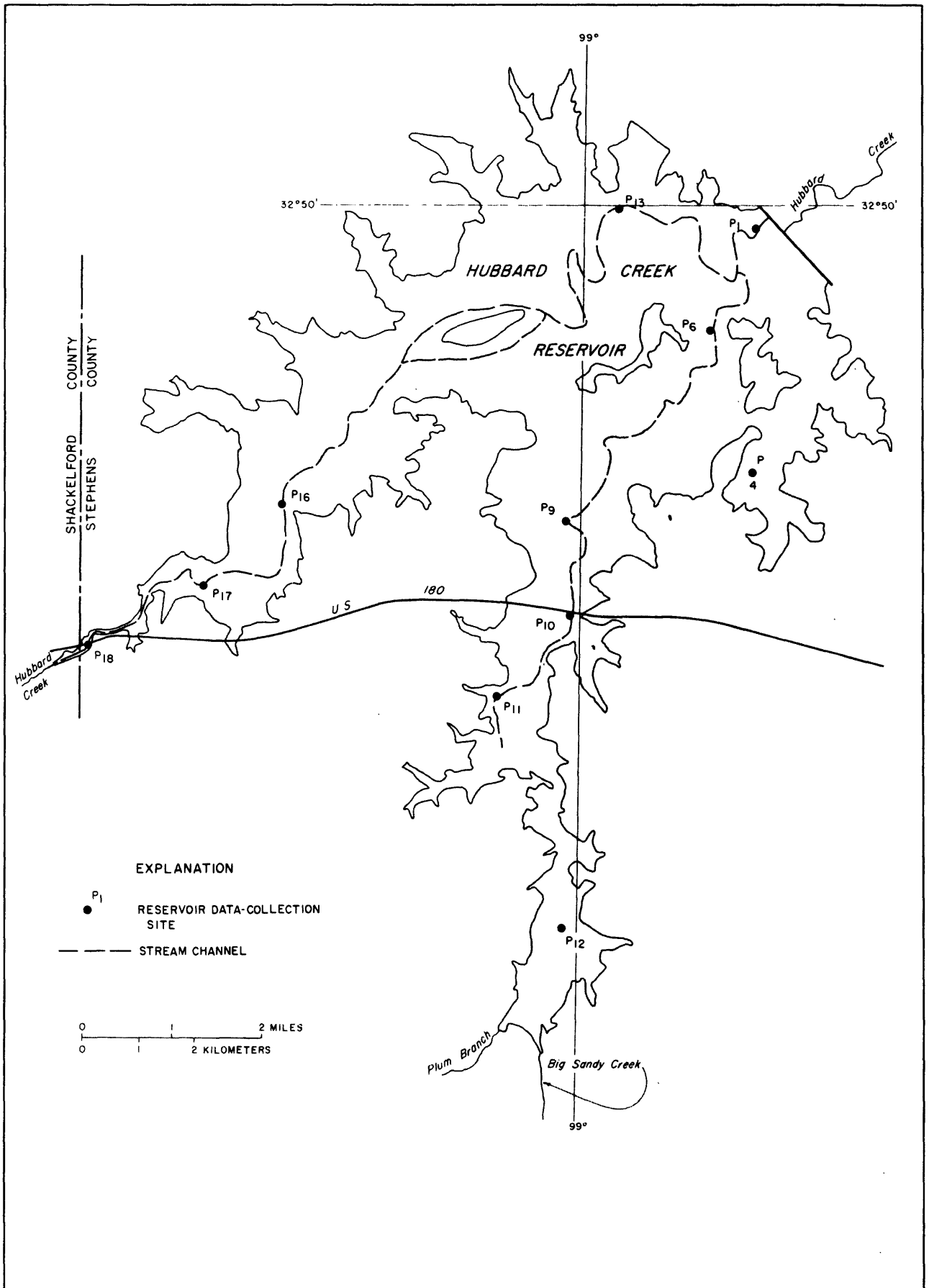

Figure 17.-Location of water-quality data-collection sites on Hubbard Creek Reservoir

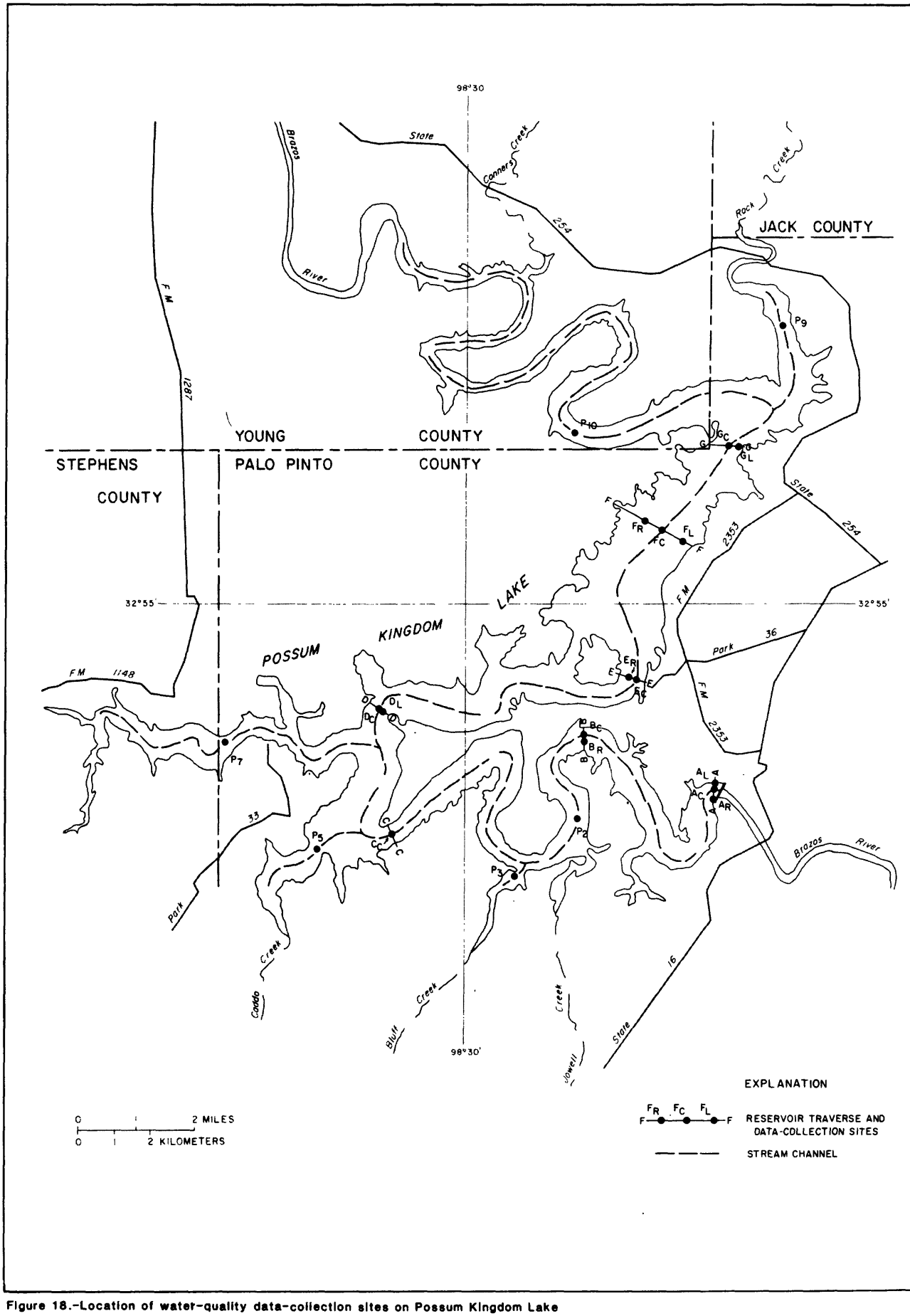

Figure 18.-Location of water-quality data-collection sites on Possum Kingdom Lake

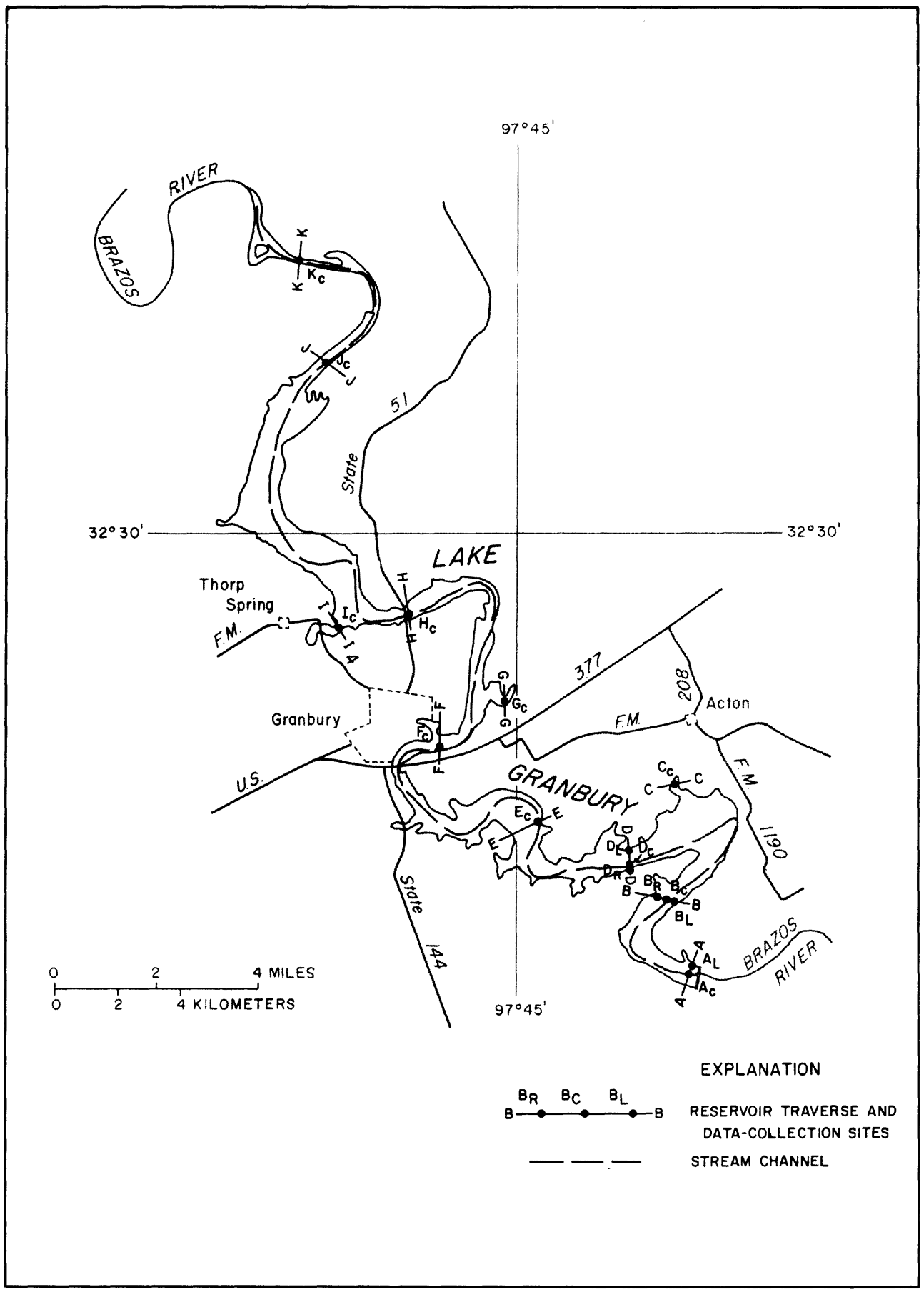

Figure 19.-Location of water-quality data-collection sites on Lake Granbury

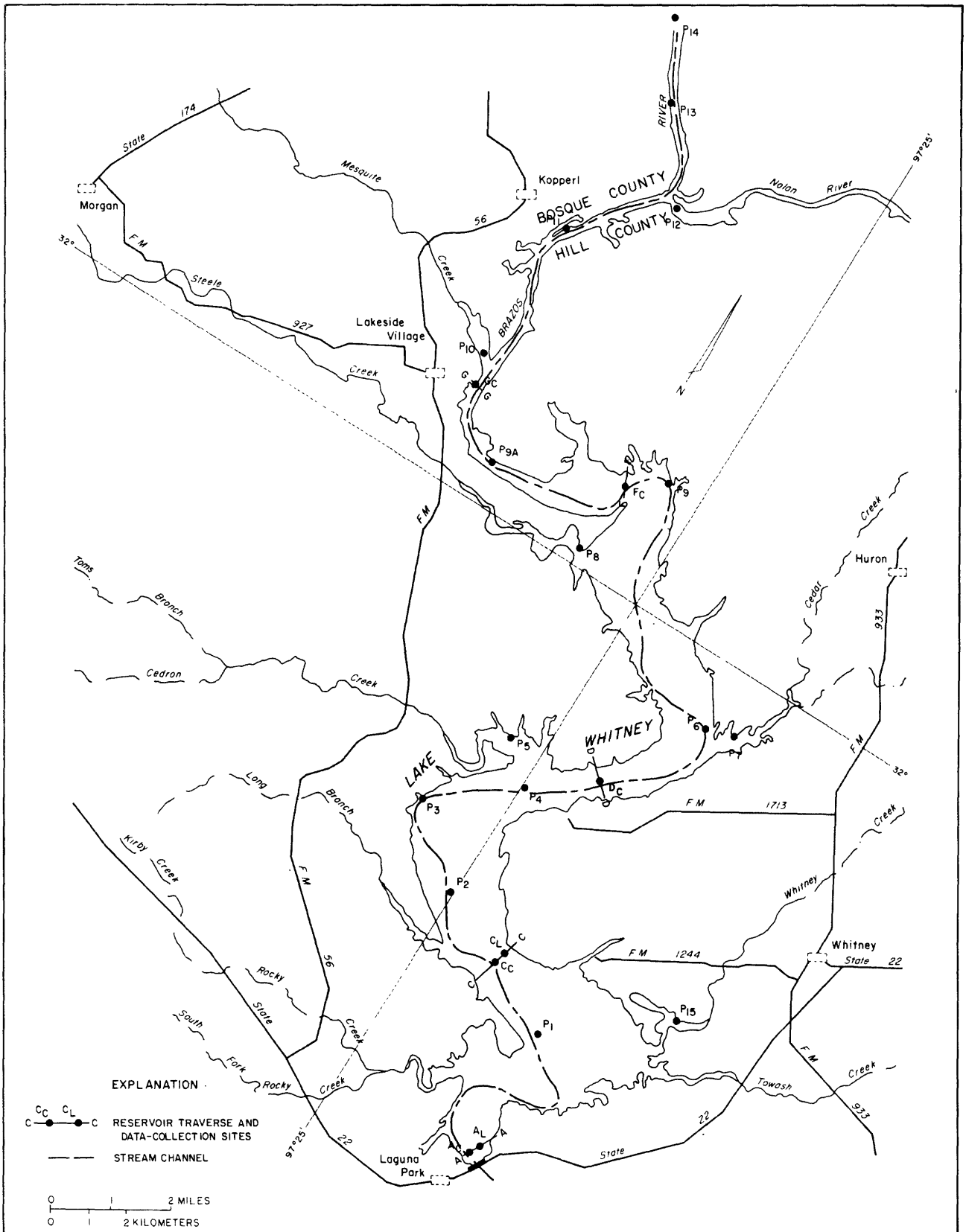

Figure 20.-Location of water-quality data-collection sites on Lake Whitney

conditions in these reservoirs before and after the flood. Data analysis emphasized changes in temperature, dissolved oxygen and specific conductance, as well as changes in the volume-weighted-average concentrations of dissolved solids and selected major ions. Profiles of specific conductance, dissolved oxygen, and temperature were prepared from data collected along the center line of the drowned river channels of each reservoir.

Reservoir Water Quality (General Considerations)

Impoundment of water in a reservoir may result in significant changes in the quality of the water. Some of the changes are related to thermal stratification--layering of the water due to temperature-induced density differences. Thermal stratification may assume many patterns, depending upon the geographical location, climatological conditions, depth, surface area, and configuration of the lake or reservoir.

During the winter, many deep reservoirs in the temperate zone are characteristically isothermal--that is, the water has a uniform temperature and density and circulates freely. With the onset of spring, solar heating warms the incoming water and the water at the reservoir surface and causes a decrease in density at water temperatures greater that 40°C. This warm surface water overlies the colder and denser water. As the surface becomes progressively warmer, the density gradient steepens and the depth to which wind can mix the water is diminished. Thus, water in the reservoir ususally is separated into three fairly distinct strata:

(1) The epilimnion---a warm freely circulating surface stratum.
(2) The metalimnion--a middle stratum characterized by a rapid decrease in temperature.
(3) The hypolimnion--a cold stagnant lower stratum.

Thermal stratification in deep reservoirs usually persists until fall, when a decrease in atmospheric temperature cools both the surface water in the reservoir and inflow from streams. When the temperatures and densities of the epilimnion and metalimnion approach those of the hypolimnion, the resistance to mixing is decreased, and wind action produces a complete mixing or overturn of the water in the lake or reservoir. This process is commonly referred to as "fall overturn."

The distribution of dissolved oxygen in a reservoir is affected by thermal stratification. Oxygen enters the surface stratum of a reservoir by plant photosynthesis and by absorption from the atmosphere. During winter circulation, the water is exposed to the atmosphere repeatedly, and dissolved oxygen utilized in the decomposition of organic matter is replenished. However, during spring and summer, thermal stratification results in a decrease of vertical circulation of the water. Oxygen utilized in the decomposition of organic material is not replaced in the deep stratum of the reservoir, and a vertical dissolved-oxygen gradient develops (Rawson, 1979).

Long-term variations of chemical constituents in lakes and reservoirs usually are difficult to determine because of the large seasonal and areal variations of these constituents within the lake or reservoir. The determination of long-term variations of chemical constituents requires the computation

of volume-weighted-average concentrations for each reservoir survey. This allows for each individual measurement of the desired constituent to be weighted on an equal basis by the volume of water each measurement represents. The volume-weighted-average concentration then represents the concentration of a constituent if the reservoir were a thoroughly mixed homogeneous body of water. Specific-conductance data and result of analyses for dissolved solids, chloride, sulfate, and hardness collected during 1978-81 were used to compute volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness for each reservoir.

Hubbard Creek Reservoir

Temperature

Data collected during the August 4, 1981, water-quality survey on Hubbard Creek Reservoir showed a pattern of thermal stratification that is typical of reservoirs in north-central Texas during the summer months (fig. 21 and table 21). The water temperature at site P_1 near the dam ranged from 30.5°C near the surface to 24.5°C near the bottom. In the headwaters of the reservoir, water temperatures at site P_{18} in the Hubbard Creek arm of the reservoir ranged from 30.5°C near the surface to 28.0°C near the bottom. In the Big Sandy Creek arm of the reservoir, water temperatures at site P_{12} ranged from 29.5°C near the surface to 27.5°C near the bottom.

Data collected during the October 27, 1981, water-quality survey show that water temperatures near the reservoir surface were 10° to 15°C less than during the August water-quality survey (fig. 21 and table 22). The reservoir was fairly well mixed from top to bottom although some longitudinal variations in water temperature were noted. Water temperatures at site P_1 near the dam ranged from 17.5°C near the surface to 17.0°C near the bottom. In the Hubbard Creek arm of the reservoir, the water temperature at site P_{18} ranged from 16.0°C near the surface to 15.0°C at a depth of 10 feet. In the Big Sandy Creek arm of the reservoir at site P_{12} water temperatures ranged from 15.0°C near the surface to 14.5°C near the bottom.

Air temperature collected by the National Oceanic and Atmospheric Administration at Breckenridge, Texas and water-temperature data collected on North Fork Hubbard Creek, Clear Fork Brazos River, and Hubbard Creek Reservoir indicate that the lower, more uniform water temperatures in Hubbard Creek Reservoir during the October water-quality survey probably were a combined result of the flood and cooler air. Water temperatures in Clear Fork Brazos River near Eliasville (08087300), a nearby gaging station affected by the flood, ranged from 18.0°C to 23.0°C during October 9-23. Water temperatures in North Fork Hubbard Creek, a tributary to Hubbard Creek Reservoir which was not seriously affected by the storm ranged from 17.0°C to 25.0°C during the same time period. Water-temperature data collected by the West Central Texas Municipal Water District indicate that the average water temperature near the Hubbard Creek Dam decreased from 23.0°C on October 9 to 15.5°C on October 23. Air-temperature data collected at Breckenridge, Texas during the month of October ranged from 34.0°C to 3.5°C and averaged 19.0°C. The lowest air temperature occurred on October 25 just prior to the water-quality survey.

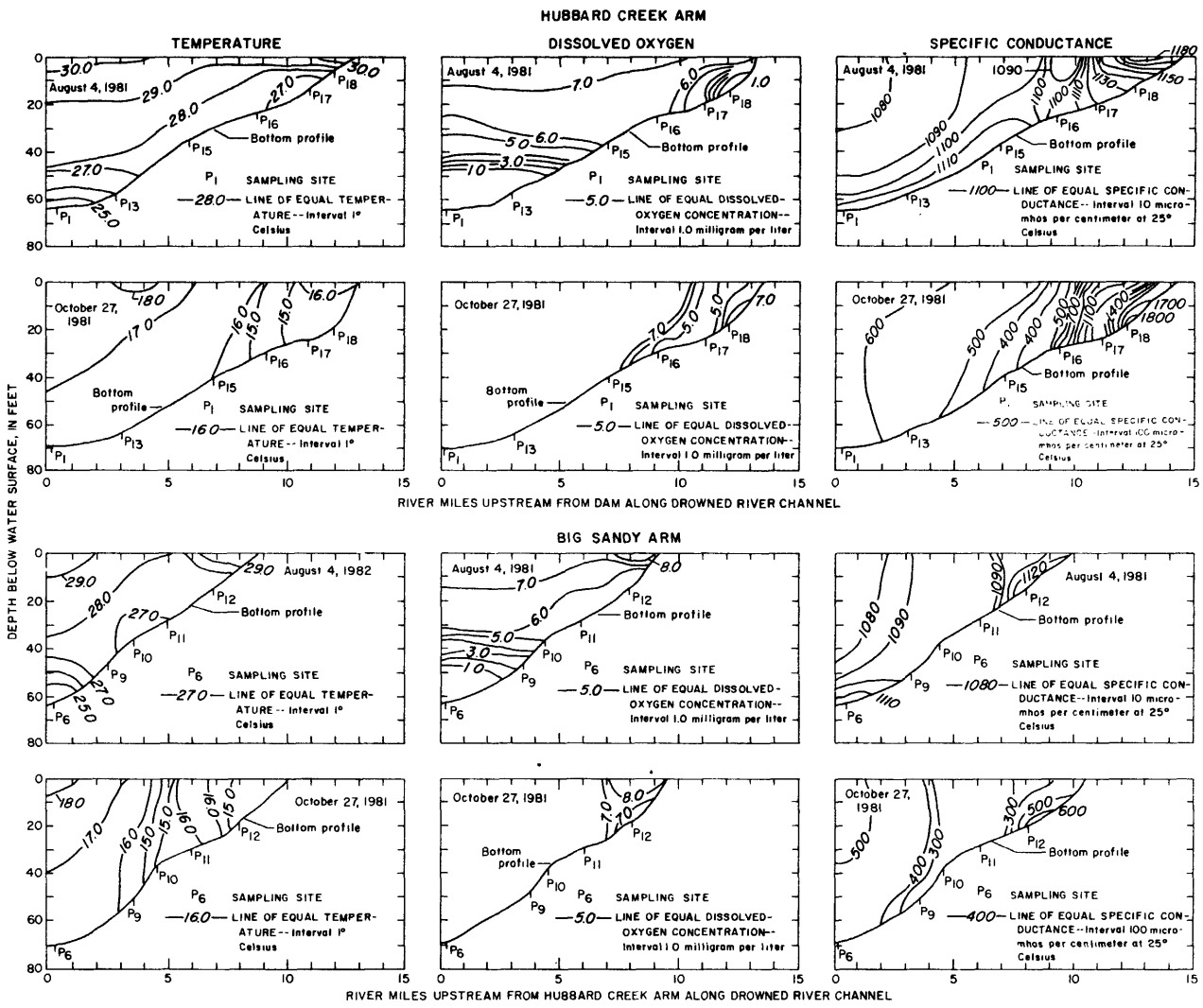

Figure 21.–Temperature, dissolved-oxygen, and specific-conductance profiles for Hubbard Creek Reservoir, August 4 and October 27, 1981

Dissolved Oxygen

Dissolved-oxygen concentrations during the August 1981 water-quality survey showed a well defined pattern of stratification. Dissolved-oxygen concentrations at site P_1 near the dam ranged from 7.4 mg/L near the surface to 0.0 mg/L near the bottom. The sharpest decrease occurred between depths of 40 to 50 feet where the dissolved-oxygen concentrations decreased from 4.7 to 0.2 mg/L. In the headwaters of the Hubbard Creek arm of the reservoir, dissolved-oxygen concentrations at site P_{18} ranged from 6.8 mg/L near the surface to 0.2 mg/L at a depth of 10 feet. In the headwaters of the Big Sandy Creek arm of the reservoir dissolved-oxygen concentrations at site P_{12} ranged from 8.5 mg/L near the surface to 5.3 mg/L near the bottom.

Although some variation was noted in dissolved-oxygen concentrations in Hubbard Creek Reservoir during the October water-quality survey, most of the vertical stratification was confined to the headwaters of the Hubbard Creek and Big Sandy Creek arms of the reservoir. Dissolved-oxygen concentrations at site P_1 near the dam ranged from 7.5 to 7.4 mg/L. In the Hubbard Creek arm of the reservoir, dissolved-oxygen concentrations at site P_{15} ranged from 7.9 mg/L near the surface to 7.6 mg/L near the bottom. At site P_{16}, two miles upstream from site P_{15} (along the drowned river channel) dissolved-oxygen concentrations ranged from 7.8 mg/L near the surface to 4.9 mg/L near the bottom. At site P_{18}, the most upstream sampling location in the Hubbard Creek arm of the reservoir dissolved-oxygen concentrations ranged from 6.3 mg/L near the surface to 7.5 mg/L at a depth of 10 feet. In the headwaters of Big Sandy Creek arm of the reservoir at site P_{12}, dissolved-oxygen concentrations ranged from 8.1 mg/L to 6.6 mg/L. The variation in dissolved oxygen from surface to bottom at most other sampling locations in the Big Sandy Creek arm of the reservoir was less than 1.0 mg/L.

Specific Conductance, Dissolved Solids, Dissolved Chloride, Dissolved Sulfate, and Hardness

Data collected during the August 1981 water quality survey show that variations of specific-conductance values throughout Hubbard Creek Reservoir were small. Specific-conductance values at site P_1 near the dam ranged from 1,080 to 1,110 µmho (micromhos per centimeter at 25° Celsius). At site P_{18} in the headwaters of the Hubbard Creek arm of the reservoir, the specific conductance ranged from 1,130 to 1,180 µmho, and the volume-weighted-average specific conductance for the Hubbard Creek arm of the reservoir was 1,090 µmho. In the headwaters of the Big Sandy Creek arm of the reservoir at site P_{12}, specific conductance values ranged from 1,110 to 1,120 µmho, and the volume-weighted-average specific-conductance value for the Big Sandy Creek arm of the reservoir was 1,080 µmho.

Data collected during the October 1981 water-quality survey show that specific-conductance values were more variable and generally were less throughout the reservoir than during the August survey, except in the headwaters of the Hubbard Creek arm of the reservoir. The more mineralized inflow from Hubbard Creek after the flood resulted in slightly greater specific-conductance values at site P_{18} than during the August water-quality survey. Specific-conductance values at site P_{18} during the October water-quality survey ranged from 1,140 to 1,880 µmho. Although greater specific-conductance values were

noted in the headwaters of the Hubbard Creek arm of the reservoir, the volume-weighted-average specific-conductance for the Hubbard Creek arm of the reservoir was 663 µmho, a 39 percent decrease between the August and October water-quality surveys.

At site P_{12} in the headwaters of the Big Sandy Creek arm of the reservoir, specific-conductance values ranged from 494 to 621 µmho. The volume-weighted-average specific-conductance for the Big Sandy Creek arm of the reservoir was 436 µmho, a 60 percent decrease between the August and October water-quality surveys.

The decrease in volume-weighted-average specific-conductance values in Hubbard Creek Reservoir is attributed to the large quantity of inflow of relatively dilute water from Hubbard Creek and Big Sandy Creek. On October 13 during peak inflow to the reservoir, the discharge-weighted-average specific-conductance was 276 µmho in Hubbard Creek and 95 µmho in Big Sandy Creek (see tables 11 and 12).

The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Hubbard Creek Reservoir also decreased significantly between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by more than 50 percent, from 570 mg/L in August to 280 mg/L in October. The volume-weighted-average concentrations of sulfate, chloride, and hardness decreased from 43 to 20 mg/L, 250 to 112 mg/L, and 260 to 140 mg/L, respectively.

The decreases in volume-weighted-average concentrations are attributed directly to the flood. Although normal fall overturn of the reservoirs may have been partly responsible for cooler water temperatures and fairly well-mixed conditions in the reservoir, fall overturn would not significantly affect the volume-weighted-average concentrations of dissolved solids, chloride, or hardness. Fall overturn and the associated oxidation of reduced sulfur species in water formerly devoid of oxygen may cause the volume-weighted-average concentrations of sulfate to increase slightly. Because the volume-weighted-average concentration or value of a constituent represents the value or concentration that each constituent would have if the reservoir were a thoroughly mixed homogeneous body of water, fall overturn would not alter the volume-weighted-average values or concentrations of most dissolved constituents.

Volume weighted-average concentrations of dissolved constituents for each of the reservoir surveys during the 1978-81 water years were computed to show the effects of the floods of August 1978 and October 1981 (fig. 22). The data clearly illustrate that floods greatly decrease the concentrations of selected constituents in the reservoir. During the June 9, 1978 water-quality survey, the volume-weighted-average concentration of dissolved solids in Hubbard Creek Reservoir was 795 mg/L. After the flood of August 1978, the volume-weighted-average concentrations of dissolved solids decreased to 436 mg/L. A gradual increase in dissolved solids occurred in the reservoir from August 1978 to August 1981. In August 1981, the volume-weighted-average dissolved-solids concentration was 570 mg/L. After the October 1981 flood, the volume-weighted-average dissolved-solids concentrations decreased to 280 mg/L. As a result of the 1978 and 1981 floods, the volume-weighted-average dissolved-solids concen-

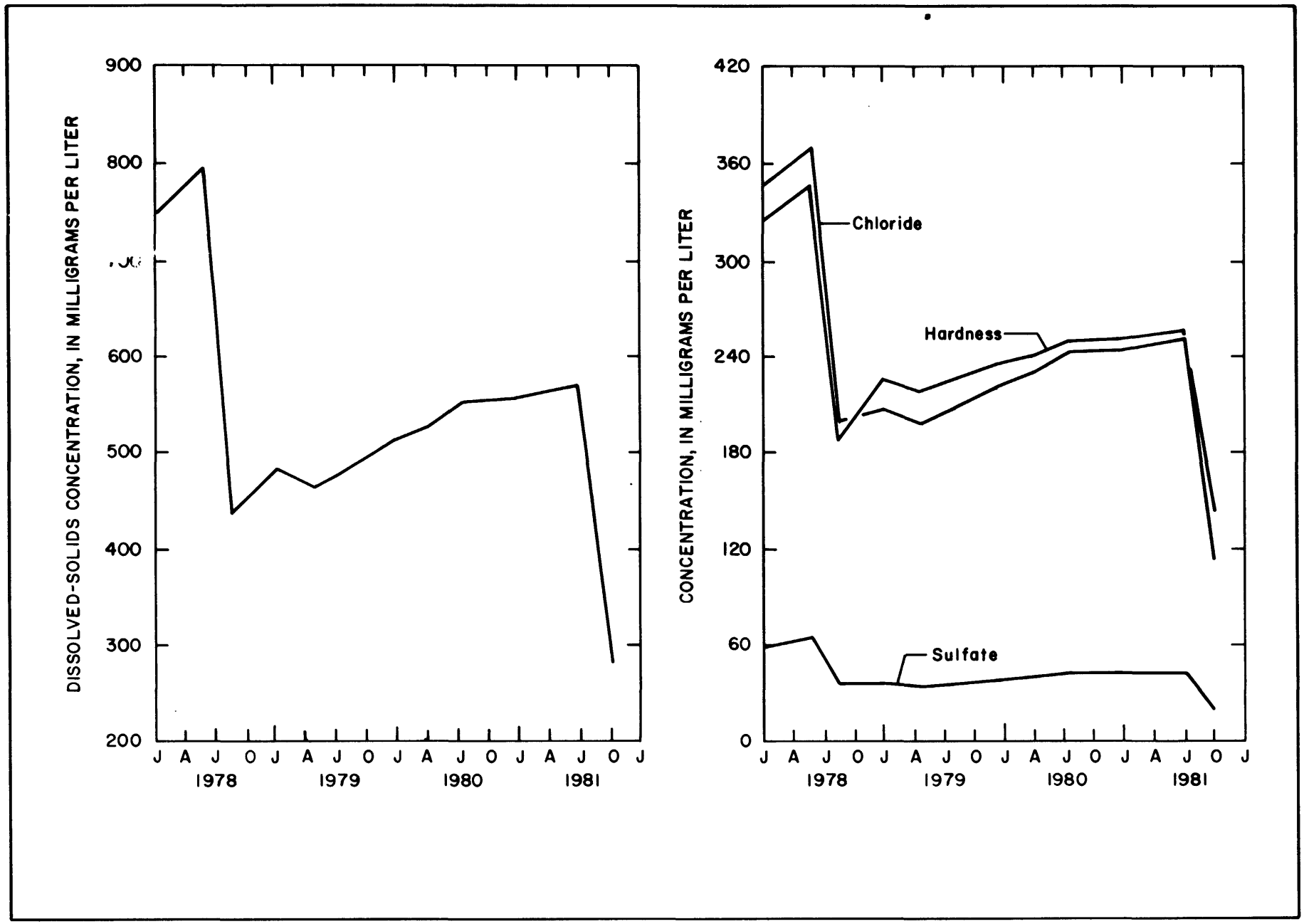

Figure 22.–Variations in volume-weighted-average concentrations of dissolved solids, dissolved chloride, dissolved sulfate, and hardness in Hubbard Creek Reservoir, 1978-81

trations in Hubbard Creek Reservoir have shown a net decrease of 514 mg/L from June 1978 to October 1981. Similar decreases also were noted in the volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness.

Possum Kingdom Lake

Temperature

Temperature data collected on Possum Kingdom Lake during the August 5-6, 1981 water-quality survey showed a pattern of well defined thermal stratification throughout most of the reservoir (fig. 23 and table 23). Water temperatures at site A_C near the dam ranged from 30.0°C near the surface to 17.5°C near the bottom. Differences between surface and bottom water temperatures along the drowned river channel continued to be at least 5°C as far up the reservoir as site E_C. The sharpest declines in water temperature in the reservoir between sites A_C and E_C occurred at depths below 30 feet. Depths along the drowned river channel for most sampling sites upstream from site E_C are generally less than 40 feet, and thermal stratification was not as pronounced at these locations. In the headwaters of the reservoir, water temperatures at site G_C ranged from 30.0°C near the surface to 29.0°C near the bottom. At site P_{10}, the most upstream sampling location on the reservoir, water temperatures were 29.5°C from top to bottom.

Data collected during the October 28, 1981, water-quality survey showed that water temperatures in the reservoir were lower than during the August survey and the uniformity of water temperature from top to bottom indicate that the reservoir was fairly well mixed (fig. 23 and table 24). Longitudinal variation in water temperature was noted in the reservoir with progressively cooler temperatures toward the headwaters. Water temperatures at site P_{10} ranged from 17.0°C near the surface to 16.0°C near the bottom. The largest variation in water temperature from surface to bottom was 2.0°C at sites D_C and F_C.

The cooler temperatures in Possum Kingdom Lake during the October water-quality survey were probably a combined result of the flood inflow and cooler air temperatures over the lake. Air temperature data at Graham, Texas, recorded by the National Oceanic and Atmospheric Administration for the month of October, ranged from 35.0° to 0.5°C and averaged 18.0°C. Although no water temperature data are available for inflow into the reservoir or for the reservoir immediately prior to the October storm, it is doubtful that air temperature could have been solely responsible for the cooler, well mixed water in the reservoir at the time of the October water-quality survey.

Dissolved Oxygen

Dissolved-oxygen concentrations in Possum Kingdom Lake during the August water-quality survey showed a well-defined pattern of stratification. Dissolved-oxygen concentrations near the surface of the reservoir ranged from 6.4 to 7.7 mg/L. At most sampling locations between site A_C near the dam and site D_C, approximately 16 miles upstream along the drowned river channel, dissolved-oxygen concentrations below a depth of approximately 40 feet were less than 1.0 mg/L. Dissolved-oxygen concentrations near the surface at sites E_C, F_C and G_C ranged from 6.8 to 7.1 mg/L while concentrations near the

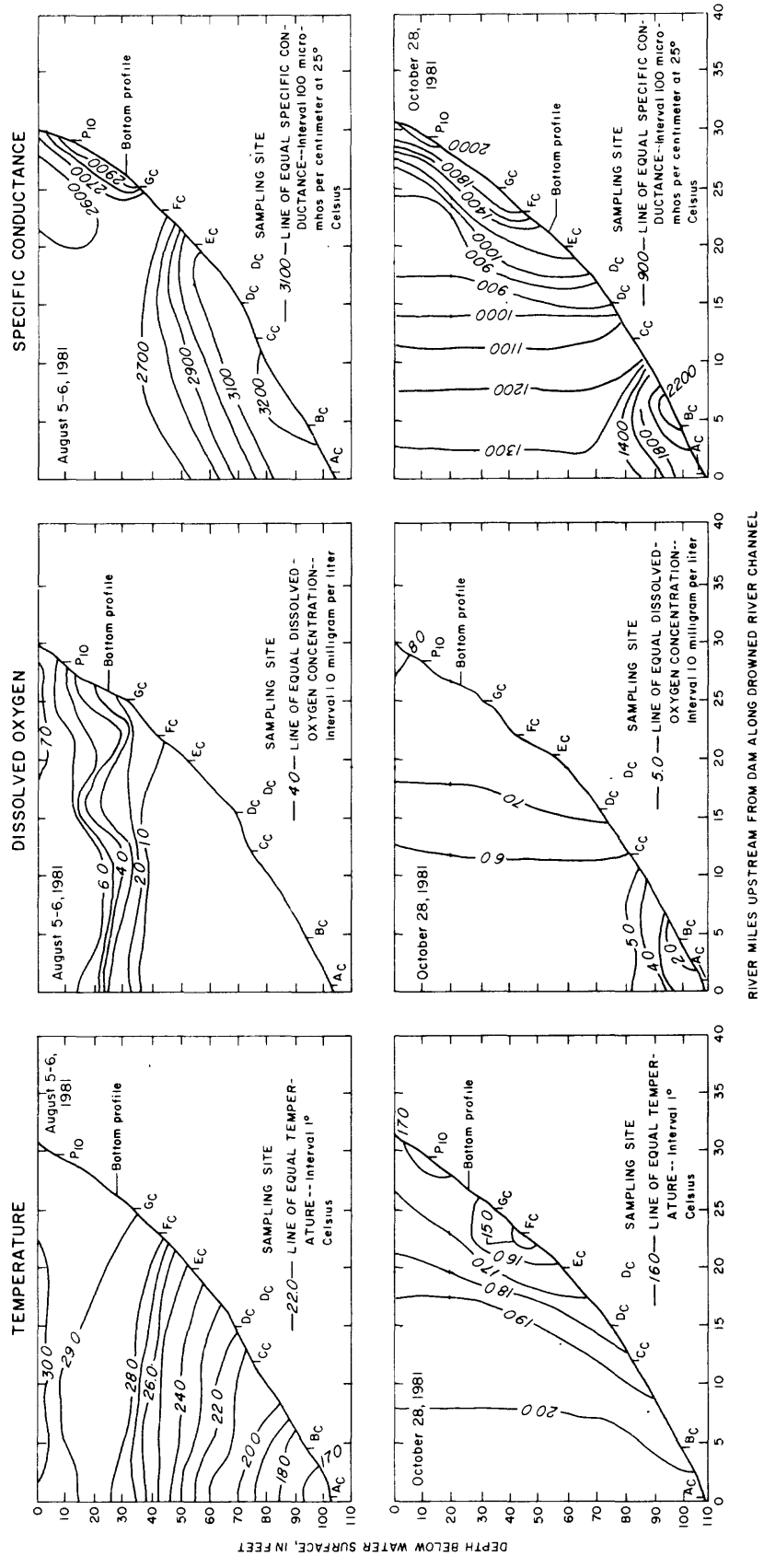

Figure 23.-Temperature, dissolved-oxygen, and specific-conductance profiles for Possum Kingdom Lake, August 5-6 and October 28, 1981

bottom were 0.2, 2.2, and 1.3 mg/L respectively. At site P_{10}, the furthest upstream sampling location, dissolved-oxygen concentrations ranged from 7.7 mg/L near the surface to 6.0 mg/L near the bottom.

Dissolved-oxygen concentrations in Possum Kingdom Lake during the October water-quality survey were generally uniform from surface to bottom, although significant decreases in concentration were noted at sites A_C and B_C at depths greater than 80 feet. Significant longitudinal variations in dissolved-oxygen concentrations were noted in the reservoir. Dissolved-oxygen concentrations at site A_C near the dam ranged from 5.4 mg/L near the surface to 5.1 mg/L at a depth of 80 feet to 2.3 mg/L near the bottom. Concentrations at site G_C in the headwaters of the reservoir ranged from 7.7 mg/L near the surface to 7.6 mg/L near the bottom. At site P_{10}, dissolved-oxygen contentrations ranged from 8.5 mg/L near the surface to 7.8 mg/L near the bottom.

Specific Conductance, Dissolved Solids, Dissolved Chloride, Dissolved Sulfate, and Hardness

Data collected during the August 1981 water-quality survey show that specific-conductance stratification of the water occured at most sites in Possum Kingdom Lake. At site A_C near the dam, specific-conductance values ranged from 2,670 µmho near the surface to 3,170 µmho near the bottom. At site E_C, specific-conductance values ranged from 2,620 µmho near the surface to 3,050 µmho near the bottom. Stratification was also noted at shallow sites G_C and P_{10}, in the headwaters of the reservoir. Specific-conductance values at site G_C ranged from 2,590 µmho near the surface to 2,960 µmho near the bottom. At site P_{10}, the specific conductance ranged from 2,820 µmho near the surface to 2,900 µmho near the bottom. The volume-weighted-average specific conductance for Possum Kingdom Lake at the time of the August water-quality survey was 2,660 µmho.

Specific-conductance data collected during the October 1981 water-quality survey shows that the reservoir was fairly well mixed from top to bottom with the exception of the deep sites near the dam. The specific conductance of water at site A_C ranged from 1,300 µmho near the surface to 1,940 µmho near the bottom. At site B_C, approximately 5 miles upstream along the drowned river channel, specific-conductance values ranged from 1,250 µmho near the surface to 2,340 µmho near the bottom.

Longitudinal variation in specific conductance was also noted during the October water-quality survey. Specific-conductance values were less near the center of the reservoir at site D_C than those near the dam or near the headwaters of the lake. The specific conductance at site D_C ranged from 965 µmho near the surface to 817 µmho near the bottom. In the headwaters of the reservoir, the specific conductance of the water was considerably greater, reflecting the more mineralized inflow from the Brazos River after the flood. Specific-conductance values at site G_C ranged from 982 µmho near the surface to 1,880 µmho near the bottom. The volume-weighted-average specific-conductance value for Possum Kingdom Lake at the time of the October water-quality survey was 1,110 µmho, a decrease of 58 percent from the August water-quality survey.

The volume-weighted-average concentrations of dissolved solids, chloride,

sulfate, and hardness in Possum Kingdom Lake also decreased significantly between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by 57 percent, from 1,560 mg/L in August to 665 mg/L in October. The volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness decreased from 626 to 272 mg/L, 313 to 127 mg/L, and 454 to 187 mg/L, respectively.

The change in volume-weighted-average values of specific conductance and concentrations of dissolved solids, chloride, sulfate, and hardness is attributed to the large quantity of inflow of relatively dilute water. The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Possum Kingdom Lake at the time of the October water-quality survey are slightly less than the estimated concentrations for the Brazos River at South Bend for the month of October (table 14). Volume-weightedaverage concentrations in Possum Kingdom Lake were slightly less than those at South Bend because of the large quantity of relatively dilute inflow from Big Cedar Creek and the ungaged inflow between Brazos River at South Bend and the reservoir.

Figure 24 shows that the floods of August 1978 and October 1981 had a pronounced effect on selected dissolved constituents in Possum Kingdom Lake. During the June 1978 water-quality survey, the volume-weighted-average concentration of dissolved solids in Possum Kingdom Lake was 2,380 mg/L. After the August 1978 flood, the volume-weighted-average concentration of dissolved solids was 792 mg/L. A progressive increase in dissolved solids occurred between August 1978 and August 1981 because of the more highly mineralized water entering the reservoir from the Brazos River. In August 1981, the volume-weighted-average dissolved-solids concentration was 1,560 mg/L. After the October flood, the volume-weighted-average concentration of dissolved solids was 665 mg/L. Similar decreases in volume-weighted-average concentrations have also occurred for dissolved chloride, sulfate, and hardness.

Lake Granbury

Temperature

Data collected during the August 6-7, 1981 water-quality survey of Lake Granbury showed a definite pattern of thermal stratification in the reservoir (fig. 25 and table 25). The largest decreases in water temperature were noted at depths of greater than 35 feet. The temperature at site F_C, 16 miles upstream from the dam, ranged from 31.5°C near the surface to 29.5°C near the bottom. The temperature at site A_C near the dam ranged from 30.5°C at the surface to 21.5°C at the bottom. Upstream from site F_C, where water depths are less than about 35 feet, water temperature ranged from 31.0°C at the surface to 28.5°C near the bottom.

Data collected during the October 29, 1981 water-quality survey showed that the water temperature in the reservoir was less than during the August survey and that the reservoir was well mixed from surface to bottom (fig. 25 and table 26). The water temperature at site A_C ranged from 18.5°C near the surface to 18.0°C near the bottom. The variation in water temperature from the surface to the bottom was less than 1.5°C at all other sampling locations in the reservoir.

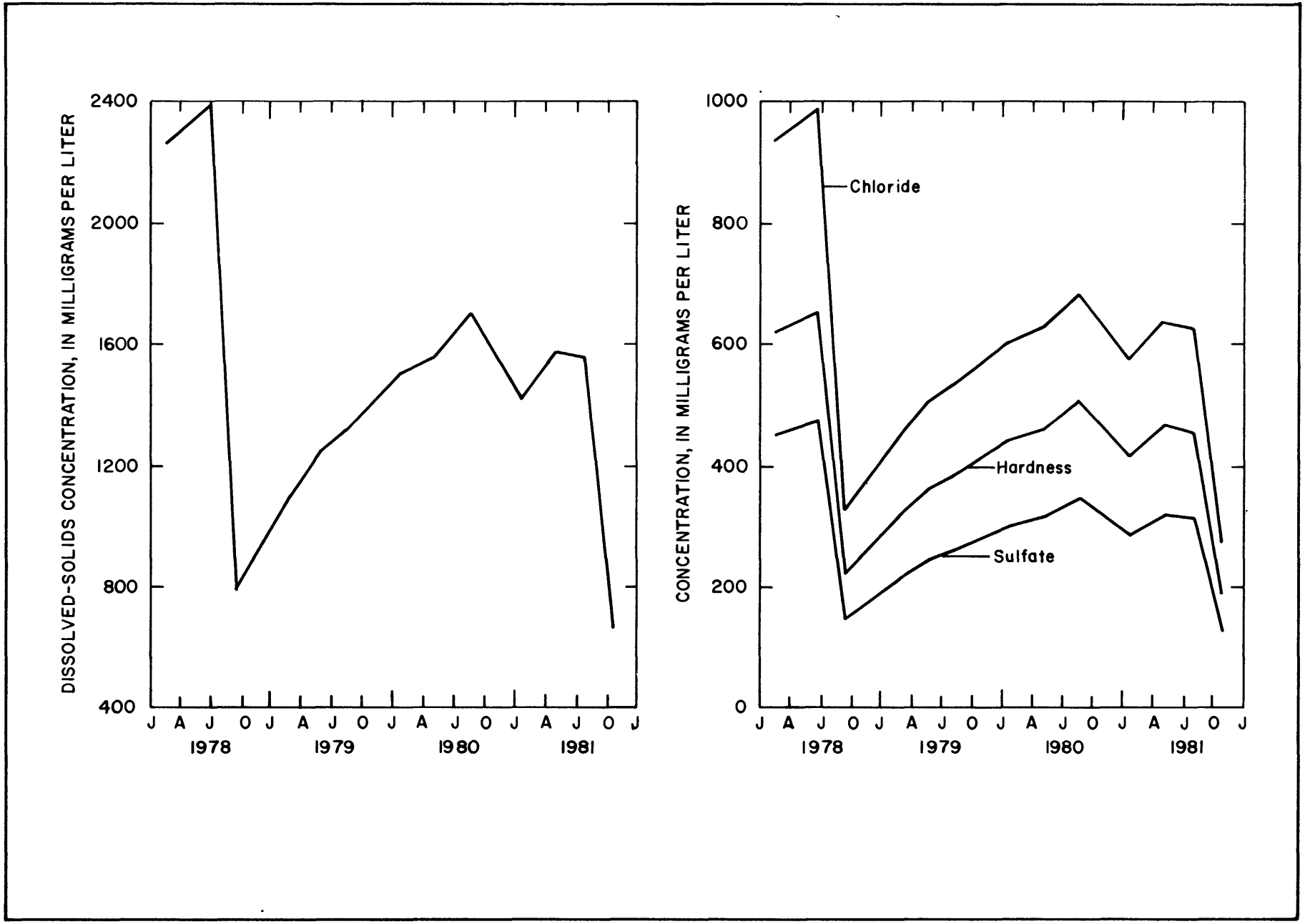

Figure 24.–Variations in volume-weighted-average concentrations of dissolved solids, dissolved chloride, dissolved sulfate, and hardness in Possum Kingdom Lake, 1978-81

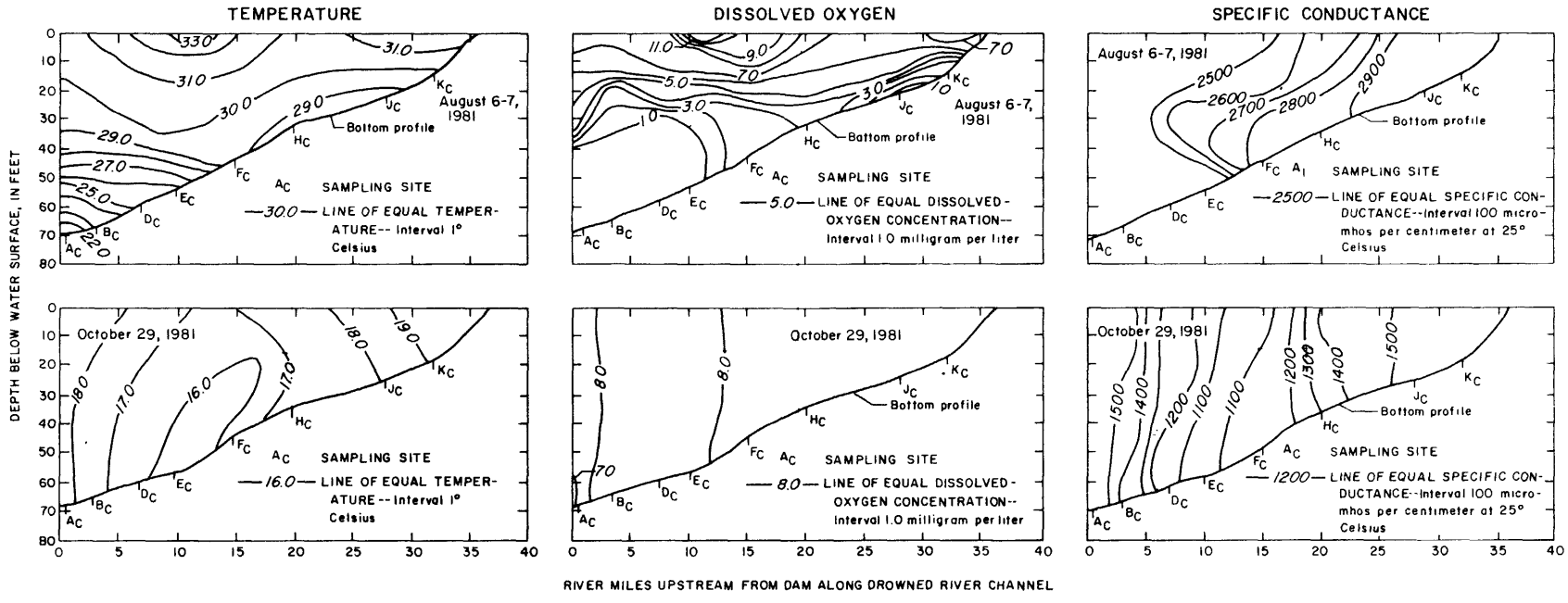

Figure 25.-Temperature, dissolved-oxygen, and specific-conductance profiles for Lake Granbury, August 6-7 and October 29, 1981

Air temperature data collected by the National Oceanic and Atmospheric Administration at Glen Rose, Texas, approximately 12 miles southwest of Lake Granbury, and water temperature data collected at Brazos River near Dennis indicate that the cooler waters in Lake Granbury at the time of the October water-quality survey were probably a combined result of the flood and cooler air temperatures. Water temperatures in the Brazos River near Dennis ranged from 16.0°C to 23°C between October 11-29.

Water temperatures during increased flows on October 13 and 14 were 20.0°C and 22.0°C respectively. The coolest temperatures of 16.0°C occurred on October 24 and 25, just prior to the water-quality survey.

Air temperatures for the month of October ranged from 35.0°C to -0.5°C and averaged 20°C at Glen Rose, Texas. The coolest air temperatures of -0.5°C and 0.0°C occurred on October 24 and October 27, respectively, just prior to the water-quality survey.

Dissolved Oxygen

Dissolved oxygen concentration in Lake Granbury during the August 1981 water-quality survey indicated a typical summer stratification pattern at sites deeper than about 30 feet. At depths below 30 feet, most of the oxygen was depleted, while dissolved-oxygen concentrations near the surface of the reservoir were near or above saturation. At site A_C near the dam, the dissolved-oxygen concentrations ranged from 7.0 mg/L near the surface to 0.1 mg/L near the bottom. At site H_C, approximately 20 miles upstream from the dam along the drowned river channel, dissolved-oxygen concentrations ranged from 7.1 mg/L near the surface to 3.5 mg/L near the bottom. At site K_C near the headwaters of the reservoir, the dissolved-oxygen concentrations ranged from 7.3 mg/L near the surface to 2.5 mg/L near the bottom.

Data collected during the October 1981 water-quality survey revealed that dissolved oxygen from surface to bottom at all sampling locations was much more uniform than during the August survey and only a slight longitudinal variation was noted in dissolved-oxygen concentrations throughout the reservoir. At site A_C, dissolved-oxygen concentrations ranged from 7.1 mg/L near the surface and bottom to 7.3 mg/L at several intermediate depths. The dissolved oxygen concentrations at F_C ranged from 7.4 mg/L near the surface to 7.2 mg/L near the bottom. At site K_C, dissolved-oxygen concentrations ranged from 7.6 mg/L at a depth of 10 feet to 7.3 mg/L near the bottom.

Specific Conductance, Dissolved Solids, Dissolved Chloride, Dissolved Sulfate, and Hardness

Data collected during the August 1981 water-quality survey on Lake Granbury showed little variation in specific conductance values at sites A_C and B_C, two of the deeper sampling sites on the reservoir. Some vertical variation was noted at sites D_C and E_C where the largest specific-conductance values occurred at depths of 30-40 feet. Specific-conductance values at site D_C ranged from 2,470 µmho at a depth of 10 feet to 2,660 µmho at a depth of 30 feet and to 2,480 µmho near the bottom. At site E_C specific-conductance values ranged from 2,480 µmho near the surface to 2,720 µmho at a depth of 40 feet to 2,490 µmho near the bottom. At sites F_C and H_C specific-conductance

values were slightly larger near the bottom than near the surface. The volume-weighted-average specific-conductance value for Lake Granbury during the August water-quality survey was 2,580 µmho.

The October water-quality survey of Lake Granbury showed little vertical variation in specific conductance, although some longitudinal variations were noted. Specific-conductance values at site A_C near the dam ranged from 1,510 µmho near the surface to 1,520 µmho near the bottom. At site K_C in the headwaters of the reservoir, the specific-conductance was 1,570 µmho at the surface and bottom. The smallest specific-conductance values were observed at sites E_C and F_C where values ranged from 1,080 to 1,140 µmho and from 1,090 to 1,130 µmho, respectively. The volume-weighted-average specific-conductance value for Lake Granbury at the time of the October water-quality survey was 1,320 µmho, a 49 percent decrease from the volume-weighted-average specific-conductance value found in August.

The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Lake Granbury decreased significantly between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by 51 percent, from 1,520 mg/L in August to 750 mg/L in October. The volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness decreased from 600 to 280 mg/L, from 310 to 140 mg/L, and from 450 to 250 mg/L, respectively.

The decrease in volume-weighted-average values of specific conductance and concentrations of dissolved solids, chloride, sulfate, and hardness is attributed directly to the large amount of relatively dilute flood inflow from the Brazos River. The 1,074,000 acre-feet of water which flowed past the Brazos River near Dennis during October 1981 is about seven times the designed flood capacity of Lake Granbury. The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Lake Granbury at the time of the October water-quality survey were slightly less than those computed for the Brazos River near Dennis, Texas for the month of October.

Figure 26 shows the long-term effects of flooding on the volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness concentrations in Lake Granbury. Following the August 1978 flood, the volume-weighted-average concentration of dissolved solids decreased from 1,480 to 1,320 mg/L. Increased inflow to the reservoir in the spring of 1979 caused the volume-weighted-average concentration of dissolved solids to decrease from 1,580 mg/L on February 14 to 630 mg/L on May 14, a decrease of 60 percent. The October 1981 flood caused the volume-weighted-average concentration to decrease from 1,520 mg/L in August 1981 to 750 mg/L in October. Large variations in volume-weighted-average concentrations of dissolved constituents are more likely to occur in Lake Granbury than in Hubbard Creek Reservoir, Possum Kingdom Lake, or Lake Whitney because the storage capacity is much smaller.

Lake Whitney

Temperature

Temperature data collected during the August 12, 1981, water-quality survey of Lake Whitney showed a well-defined pattern of thermal stratification through-

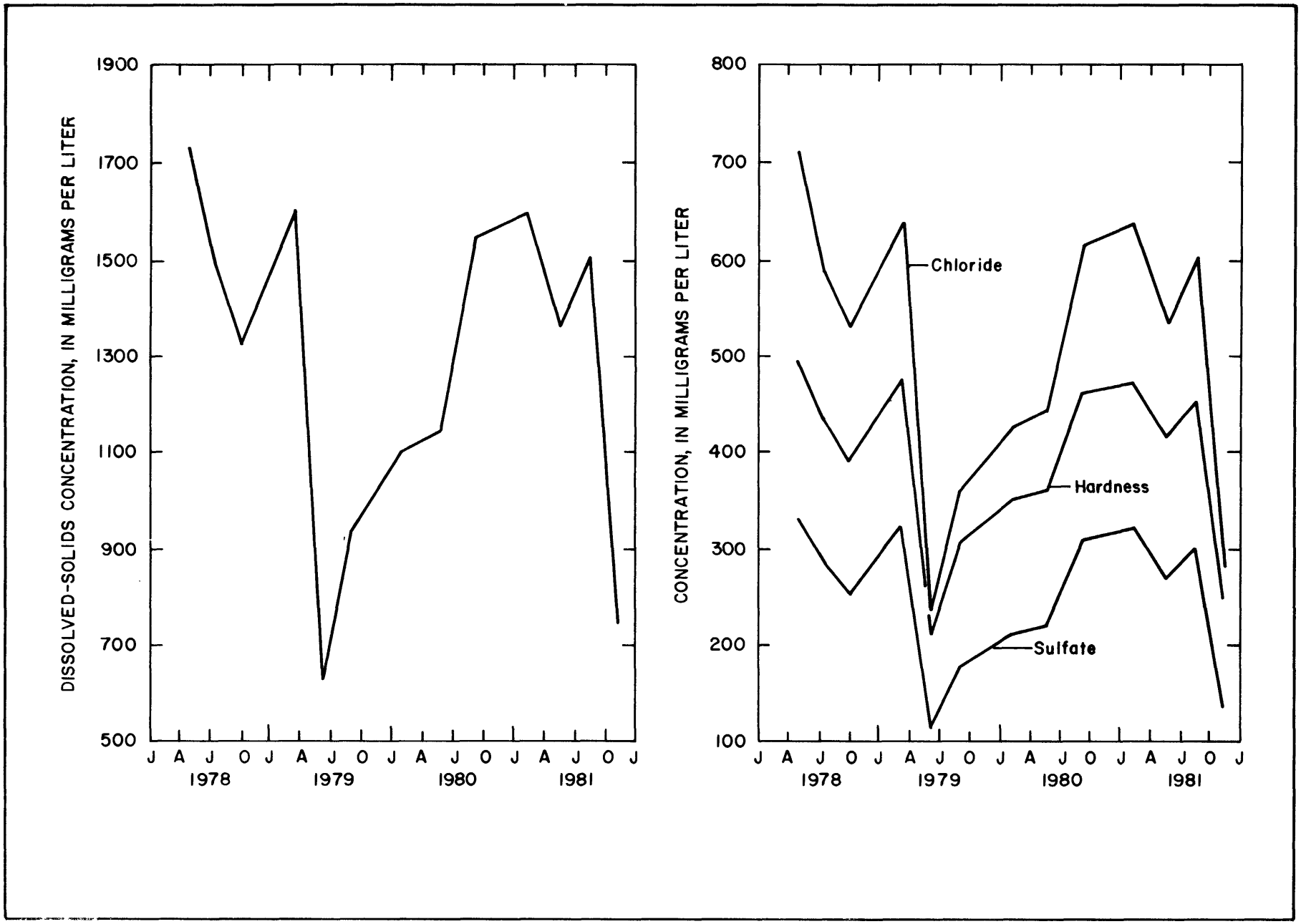

Figure 26.-Variations in volume-weighted-average concentrations of dissolved solids, dissolved chloride, dissolved sulfate, and hardness in Lake Granbury, 1978-81

out most of the reservoir (fig. 27 and table 27). The temperature at site A_C near the dam ranged from 29.5°C near the surface to 20.5°C near the bottom. The sharpest declines in temperature occurred at depths below 30 feet. Upstream along the drowned river channel, as the depth of the sampling locations gradually decreased, the difference in temperature from top to bottom decreased. Near the headwaters of the reservoir at site P_{11}, the depth was less than 30 feet and the water temperature varied only 2.5°C, from 32.0°C near the surface to 29.5°C near the bottom.

Temperature data collected during the October 30, 1981, water-quality survey showed that water temperatures in the reservoir were cooler than the water temperatures reported in the August survey and that the reservoir was well mixed from top to bottom (fig. 27 and table 28). The water temperature at site A_C near the dam was 19.0°C from surface to bottom. The water temperature at site P_{11}, located 27 miles upstream from the dam, differed by 1.0°C or less from the water temperature at site A_C. The temperatures at site P_{11} ranged from 18.0°C near the surface to 18.5°C near the bottom.

Air temperature recorded by the National Oceanic and Atmospheric Administration at Hillsboro, Texas showed that temperatures for the month of October 1981 ranged from 35.0°C to 3.5°C and the monthly average temperature was 20.5°C. The coolest temperature occurred on October 26, just prior to the water-quality survey, so it is probable that the cooler, well-mixed conditions in the reservoir were due, in part, to cooler air temperatures. No continuous temperature data are available for inflow into the reservoir or for the reservoir itself immediately prior to the October storm to show the effect of the floodwaters, but because the reservoir contents increased from approximately 530,000 acre-feet on October 12 to approximately 1,050,000 acre-feet by October 22, the floodwaters were probably a contributing factor to the cooler water temperatures found during the October water-quality survey.

Dissolved Oxygen

Dissolved-oxygen concentrations in Lake Whitney at the time of the August water-quality survey showed a stratification pattern typical of the summer season. At site A_C near the dam, the dissolved-oxygen concentrations ranged from 7.7 mg/L near the surface to 0.5 mg/L near the bottom. The dissolved-oxygen concentrations near the surface for other sampling locations upstream from the dam along the drowned river channel were greater than 8.0 mg/L. The dissolved-oxygen concentrations were less than 1.0 mg/L at depths below 50 feet throughout the reservoir. At site P_{11}, near the headwaters, concentrations ranged from 10.3 mg/L near the surface to 0.6 mg/L near the bottom.

Data collected during the October 1981 water-quality survey show the dissolved-oxygen concentrations to be almost uniform from surface to bottom, and only slight longitudinal variations in dissolved oxygen concentrations were noted. At site A_C, dissolved-oxygen concentrations ranged from 7.1 mg/L near the surface to 6.8 mg/L between 70 and 100 feet below the surface and 7.1 mg/L near the bottom. At site P_{11}, the concentration ranged from 7.5 mg/L near the surface to 7.1 mg/L near the bottom.

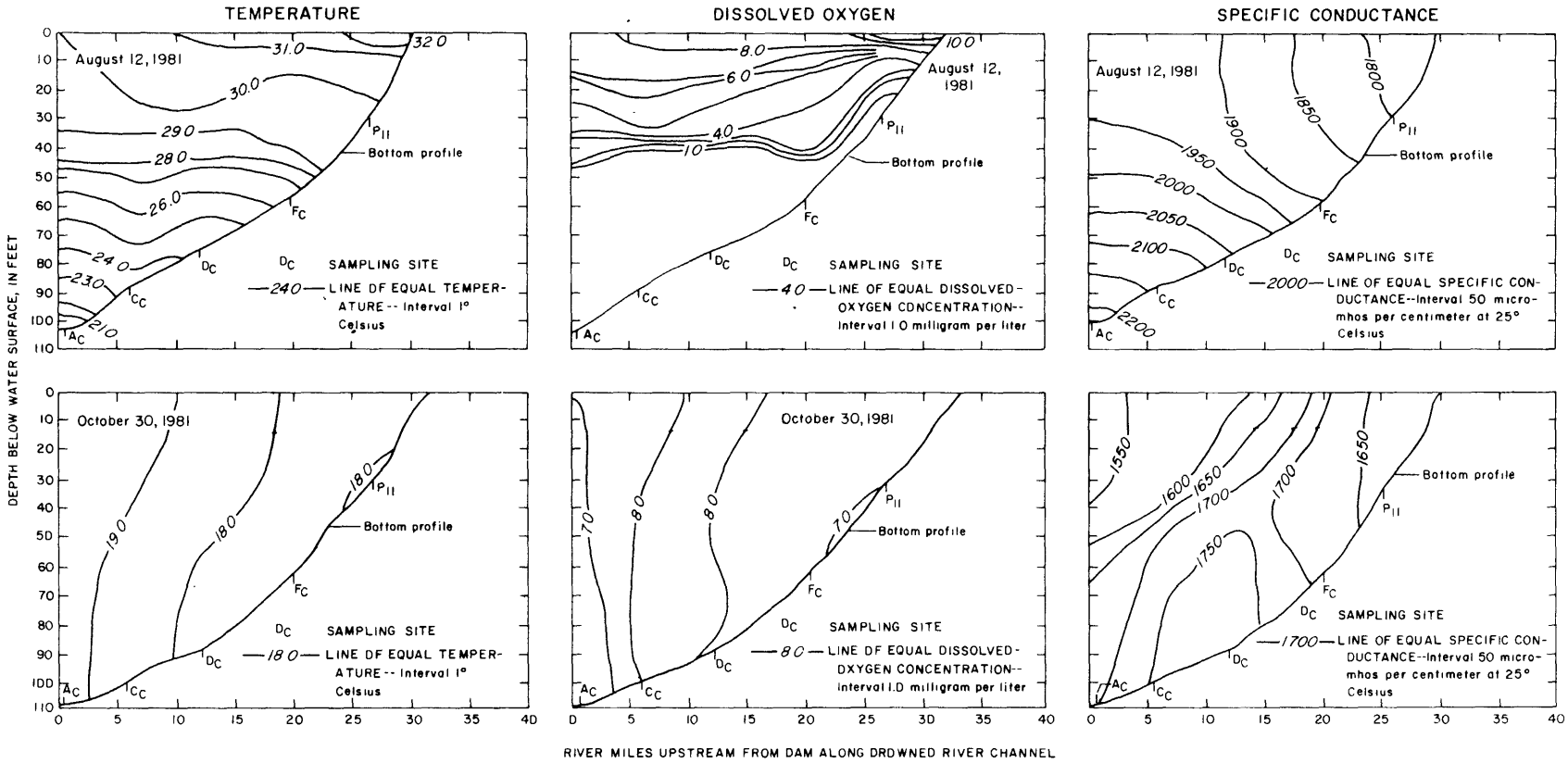

Figure 27.-Temperature, dissolved-oxygen, and specific-conductance profiles for Lake Whitney, August 12 and October 30, 1981

Specific Conductance, Dissolved Solids, Disolved Chloride, Dissolved Sulfate, and Hardness

Water-quality data collected during the August survey of Lake Whitney show a well-defined pattern of stratification throughout the reservoir for specific conductance of the water. At site A_C, the specific-conductance values ranged from 1,950 µmho near the surface to 2,200 µmho near the bottom. A decrease in the specific conductance of the water was noted as reservoir depths decreased and also in a longitudinal direction toward the headwaters of the reservoir. The smallest specific-conductance values occurred near the surface at site P_{11}, the sampling location farthest upstream along the drowned river channel. At site P_{11} the specific-conductance values ranged from 1,780 µmho near the surface to 1,790 µmho near the bottom. The volume-weighted-average specific conductance for Lake Whitney, based on the data collected during the August water-quality survey, was 1,890 µmho.

Specific-conductance data collected during the October water-quality survey continued to show a pattern of stratification, though not as well defined as during the August survey. The specific conductance of the water at site A_C ranged from 1,550 µmho near the surface to 1,700 µmho near the bottom. The specific-conductance values at site P_{11} were 1,630 µmho from surface to bottom. The largest specific-conductance values occurred at site D_C, 12 miles upstream from the dam along the drowned river channel. Specific-conductance values at this site ranged from 1,590 µmho near the surface to 1,760 µmho near the bottom.

The volume-weighted-average specific-conductance value for Lake Whitney at the time of the October survey was 1,610 µmho, a decrease of 15 percent from the August water-quality survey.

The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Lake Whitney showed only a slight decrease between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by 15 percent, from 1,090 mg/L in August to 927 mg/L in October. The volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness decreased from 424 mg/L to 355 mg/L, 212 mg/L to 179 mg/L, and 342 mg/L to 295 mg/L, respectively.

The relatively small decrease in the volume-weighted-average concentrations of dissolved constituents in Lake Whitney between the August and October water-quality surveys is partially attributed to antecedent conditions resulting from a period of heavy rainfall and inflow that occurred in the Lake Whitney area in June. On June 16, more than 5 inches of rain were reported for Whitney Dam and 6.5 inches were reported for Hillsboro. The contents of the reservoir increased from 650,000 acre-feet on June 9 to 738,200 acre-feet on June 17.

By the time of the August survey, the volume-weighted-average concentrations of dissolved constituents in Lake Whitney had already decreased by approximately 15 percent from the May 1981 water-quality survey. Although no water-quality data are available on the inflow to Lake Whitney for the October flood, discharge data for the Brazos River near Glen Rose serve as evidence that large quantities of dilute floodwater entered the reservoir. Discharge in

the Brazos River near Glen Rose totaled 553,700 ft^3/s (1,098,000 acre-feet) for the month of October and caused the contents of Lake Whitney to increase from 538,000 acre-feet on October 13 to 1,050,000 acre-feet on October 22.

The total release from the reservoir for October was only 347,222 ft^3/s-days (688,714 acre-feet) which is 409,000 acre-feet less than the total at the gaging station near Glen Rose. These data indicate that a large portion of the floodwater that entered Lake Whitney in the middle of the month remained in the reservoir at the end of the month. This, too, was a contributing factor to the relatively small decrease in the concentrations of dissolved constituents in the reservoir following the flood. Instead of replacing the water contained in Lake Whitney, the dilute floodwater was added to and, therefore, mixed with, the more concentrated water already in the reservoir.

Figure 28 shows the effects of the October 1981 flood as well as the August 1978 flood in Lake Whitney. After the August 1978 flood, the volume-weighted-average concentrations of dissolved solids in the reservoir increased by 57 percent due to the inflow of more concentrated water released from reservoirs further upstream. Large inflows of relatively dilute water in April, May, and June of 1979 caused the volume-weighted-average concentrations of dissolved solids to decrease to approximately 720 mg/L in the summer of 1979. A progressive increase in the volume-weighted-average of dissolved solids occurred between the summer of 1979 and the spring of 1981. Large inflows into the reservoir in June and October 1981 resulted in a decrease of volume-weighted-average concentrations of dissolved solids.

SUMMARY AND CONCLUSIONS

The storm that moved across north-central Texas during October 11-13, 1981, produced intense rainfall along either side of a line from east of Abilene, Texas to Breckenridge, Texas to north of Mineral Wells, Texas. Rainfall of more than 20 inches was recorded near Clyde, Texas and in several locations near Breckenridge, Texas.

Record peak discharges of 5,020 and 18,500 ft^3/s were recorded on Elm Creek at Abilene, Texas (08083430) and Cedar Creek at Abilene, Texas (08083470), respectively. A record peak discharge of 80,000 ft^3/s also was recorded at the gaging station Big Sandy Creek above Breckenridge, Texas (08086290).

The large quantity of rainfall in the Hubbard Creek drainage basin caused the water levels in Hubbard Creek Reservoir to rise 13.33 feet and the storage contents to increase from 233,000 to 441,000 acre-feet during 56 hours.

After the storm, the maximum-mean-daily discharge recorded at the gaging station Brazos River near South Bend, Texas (08088000) was 39,100 ft^3/s. Much of this water along with a record peak discharge of 34,700 ft^3/s for Big Cedar Creek near Ivan, Texas (08088450) caused the water level in Possum Kingdom Lake to rise by 7.54 feet and the storage contents to increase from 505,000 acre-feet on October 11 to 653,000 acre-feet on October 13.

Downstream from Possum Kingdom Lake the maximum discharge recorded at the gaging station Brazos River near Palo Pinto (08089000) was 68,600 $ft^3/3$, and the maximum discharge of record of 96,600 ft^3/s was recorded at the gaging

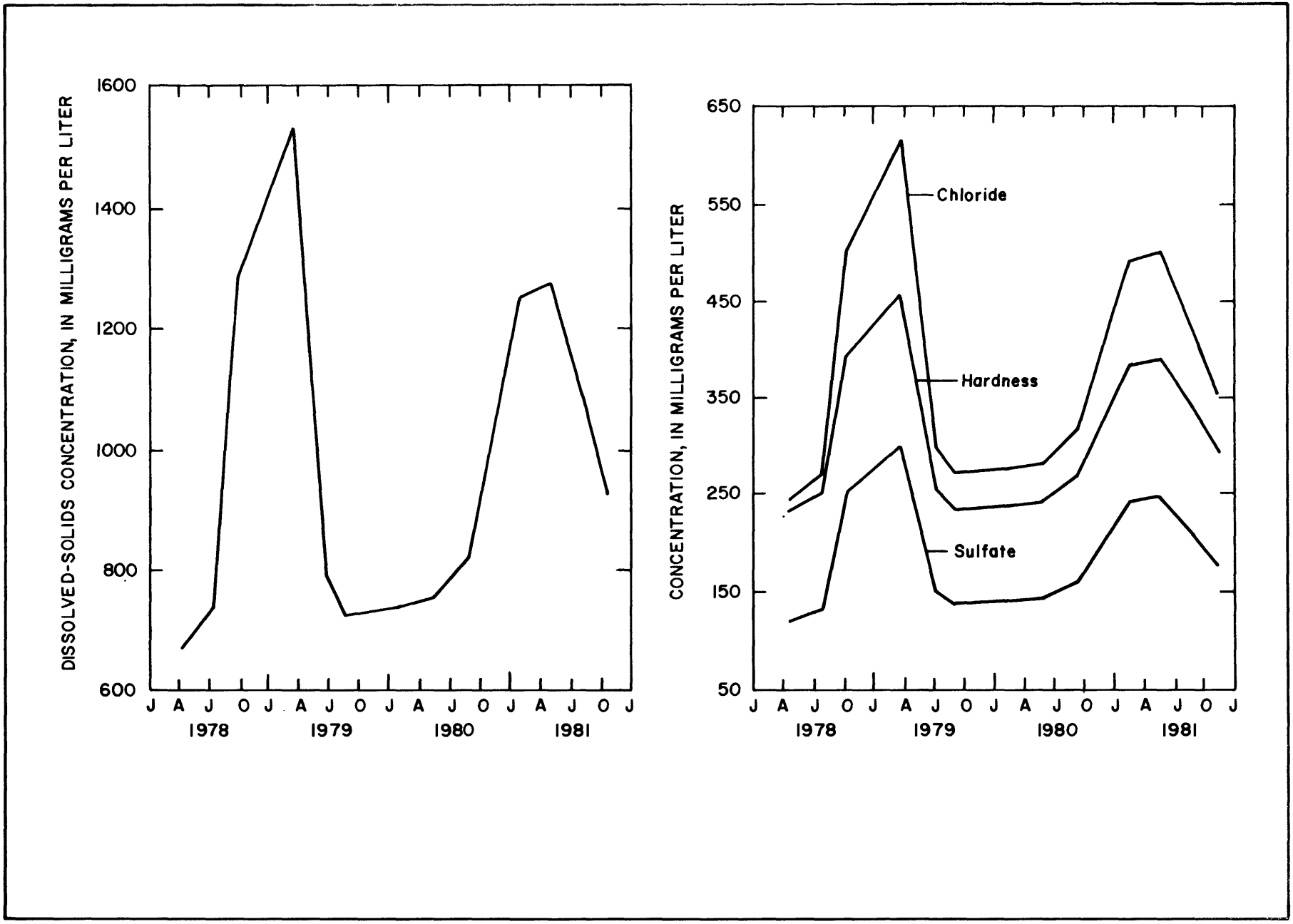

Figure 28.–Variations in volume-weighted-average concentrations of dissolved solids, dissolved chloride, dissolved sulfate, and hardness in Lake Whitney, 1978–81

station Brazos River near Dennis (08090800). The large increase in discharge between the two stations is attributed to ungaged inflow from the Palo Pinto drainage basin which received approximately 10 inches of rain during October 11-13, 1981.

Dissolved-solids concentrations in the Brazos River near Dennis decreased from 1,630 mg/L on October 6, to a minimum of 103 mg/L on October 13. The maximum daily dissolved-solids load was 245,000 tons per day on October 15. The monthly discharge-weighted-average concentration of dissolved solids for the Brazos River near Dennis was 782 mg/L, and the monthly dissolved solids load was 1,143,000 tons.

Only a 0.02-foot change was noted in the water level of Lake Granbury. Lake Granbury was not designed to detain floodwaters, therefore floodwaters were allowed to pass through the reservoir.

The peak discharge recorded for the gaging station Brazos River at Glen Rose (08091000) approximately 31 miles downstream from Lake Granbury, was 86,400 ft^3/s. Water flowing past the gaging station at Glen Rose flowed into Lake Whitney causing the water level to rise by 18.85 feet and the storage contents to increase from 538,000 acre-feet to 1,050,000 acre-feet. The net ıange in storage contents of 512,000 acre-feet is nearly equal to one-half ne 1,098,000 acre-feet of water recorded at Brazos River near Glen Rose or October. The controlled releases from Lake Whitney attenuated flood discharges in the Brazos River downstream from the reservoir.

The large volume of runoff associated with the floods in the upper Brazos River basin had a pronounced effect on the quality of water in Hubbard Creek Reservoir, Possum Kingdom Lake, Lake Granbury, and Lake Whitney. Data collected on these reservoirs during August 1981 and late October 1981 were analyzed to determine water-quality conditions in these reservoirs before and after the flood.

Temperature data collected on Hubbard Creek Reservoir during the August 1981 water-quality survey showed a pattern of thermal stratification that is typical of reservoirs in north-central Texas during the summer. Water temperature at site A_C near the dam ranged from 30.5°C near the surface to 24.5°C near the bottom. Temperature data collected during the October 1981 water-quality survey show that water temperatures near the reservoir surface were 10° to 15°C less than in August. Water temperatures at site A_C ranged from 17.5°C near the surface to 17.0°C near the bottom. The lower more uniform water temperatures in October probably were a combined result of the flood and cooler air.

Dissolved-oxygen concentrations in Hubbard Creek Reservoir also showed a typical pattern of stratification during the August 1981 water-quality survey. Dissolved-oxygen concentrations at site P_1 near the dam ranged from 7.4 mg/L near the surface to 0.0 mg/L near the bottom. Although some variation was noted in dissolved-oxygen concentrations in Hubbard Creek Resevoir after the October flood, most of the stratification was confined to the headwaters of the reservoir.

The volume-weighted-average concentrations of dissolved solids, chloride,

sulfate, and hardness in Hubbard Creek Reservoir decreased significantly between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by more than 50 percent, from 570 mg/L in August to 281 mg/L in October. The volume-weighted-average concentrations of sulfate, chloride, and hardness decreased from 43 to 20 mg/L, 250 to 112 mg/L, and 260 to 140 mg/L, respectively.

The decreases in volume-weighted-average concentrations are attributed directly to the flood. Although it is possible that normal fall overturn of the reservoir may have been partly responsible for cooler water, greater dissolved oxygen concentrations, and fairly well-mixed conditions in the reservoir, fall overturn would not significantly affect the volume-weighted-average concentrations of dissolved solids, chloride, or hardness.

Temperature data collected on Possum Kingdom Lake during the August 1981 water-quality survey showed a pattern of well defined thermal stratification throughout most of the reservoir. The sharpest declines in water temperature occurred at depths below 30 feet. Water temperatures at site A_C near the dam ranged from 30.0°C near the surface to 17.5°C near the bottom. Temperature data collected during the October water-quality survey showed water temperatures in the reservoir were less than those during the August survey and that the reservoir was fairly well mixed from surface to bottom. Water temperatures at site A_C were 20.0°C for both the surface and bottom.

Dissolved oxygen concentrations near the surface in Possum Kingdom Lake during the August water-quality survey ranged from 6.4 to 7.7 mg/L throughout the reservoir. Dissolved-oxygen concentrations at depths of greater than 40 feet generally were less than 1.0 mg/L. Dissolved-oxygen concentrations during the October water-quality survey were rather uniform from surface to bottom although some significant decrease in concentration was noted at depths of greater than 90 feet.

The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Possum Kingdom Lake decreased significantly between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by 57 percent, from 1,550 mg/L in August to 665 mg/L in October. The volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness decreased from 626 to 272 mg/L, 313 to 127 mg/L, and 454 to 187 mg/L, respectively.

Temperature data collected on Lake Granbury during the August water-quality survey showed a definite pattern of thermal stratification. The sharpest declines in temperature occurred at depths of greater than 35 feet. Water temperature at site A_C near the dam ranged from 30.5°C near the surface to 21.5°C near the bottom. Temperature data collected during the October water-quality survey showed that the water temperatures in the reservoir were less than those during the August water-quality survey and that the reservoir was well mixed from surface to bottom. Water temperatures at site A_C ranged from 18.0°C near the surface to 18.5°C near the bottom.

Dissolved-oxygen concentrations in Lake Granbury during the August 1981 water-quality survey showed a typical pattern of summer stratification. At depths greater than about 40 feet, most of the dissolved oxygen was depleted,

whereas dissolved-oxygen concentrations near the surface of the reservoir were near or above saturation. At site A_C, near the dam, dissolved-oxygen concentrations ranged from 7.0 mg/L near the surface to 0.1 mg/L near the bottom. Data collected during the October water-quality survey showed that the dissolved oxygen from surface to bottom was much more uniform than during the August survey, and only slight longitudinal variations were noted throughout the reservoir. In October, dissolved-oxygen concentrations at site A_C ranged from 7.1 mg/L near the surface to 7.3 mg/L near the bottom.

The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Lake Granbury decreased significantly between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by 51 percent, from 1,520 mg/L in August to 750 mg/L in October. The volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness decreased from 600 to 280 mg/L, from 310 to 140 mg/L, and from 450 to 250 mg/L, respectively.

Temperature data collected during the August 1981 water-quality survey of Lake Whitney showed a well defined pattern of thermal stratification throughout most of the reservoir. The temperature at site A_C near the dam ranged from 29.5°C near the surface to 20.5°C near the bottom. The sharpest declines in temperature occurred at depths below 30 feet.

Temperature data collected during the October water-quality survey showed that water temperatures in the reservoir were less than those water temperatures during in the August survey and that the reservoir had become well mixed from top to bottom. The water temperature at site A_C near the dam was 19.0°C throughout its depths.

Dissolved oxygen concentrations in Lake Whitney at the time of the August water-quality survey showed a stratification pattern typical of the summer season. At site A_C near the dam, the dissolved-oxygen concentrations ranged from 7.7 mg/L near the surface to 0.6 mg/L near the bottom.

Data collected during the October 1981 water-quality survey show the dissolved-oxygen concentration to be almost uniform from surface to bottom, and only slight longitudinal variations in dissolved-oxygen concentrations were noted. At site A_C, the dissolved-oxygen concentration ranged from 7.1 mg/L near the surface to 6.8 mg/L between 60 and 100 feet below the surface and 7.1 mg/L near the bottom.

The volume-weighted-average concentrations of dissolved solids, chloride, sulfate, and hardness in Lake Whitney showed only a slight decrease between the August and October water-quality surveys. The volume-weighted-average concentration of dissolved solids decreased by 15 percent, from 1,090 mg/L in August to 927 mg/L in October. The volume-weighted-average concentrations of dissolved chloride, sulfate, and hardness decreased from 424 to 355 mg/L, 212 to 179 mg/L, and 342 to 295 mg/L, respectively.

REFERENCES

Buckner, H. D., and Kurklin, J. K., 1984, Floods in south-central Oklahoma and north-central Texas, October 1981: U.S. Geological Survey Open-File Report 84-065, 131 p.

Helwig, J. T. and Council, K. A., eds., 1979, SAS users guide, 1979 edition: Cary, N. C., SAS Institute, Inc., 494 p.

Rawson, Jack, 1979, Water quality of Livingston Reservoir on the Trinity River, southeastern, Texas: Texas Department of Water Resources Report 230, 46 p.

Schroeder, E. E.. , Massey, B. C., and Waddell, K. M., 1979, Floods in central Texas, August 1978: U.S. Geological Survey Open-File Report 79-682, 121 p.

U.S. Army Corps of Engineers, 1981, Report on Floods in north central Texas, 11-13 October 1981 Storm: U.S. Army Corps of Engineers, Fort Worth District, 50 p.

TABLE 1.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSTITUENTS OR PROPERTIES FOR DOUBLE MOUNTAIN FORK BRAZOS RIVER AT JUSTICEBURG, TEXAS (08079600), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	0.00	*	*	0.00	*	0.00	*	0.00	*
2	0.00	*	*	0.00	*	0.00	*	0.00	*
3	0.00	*	*	0.00	*	0.00	*	0.00	*
4	0.00	*	*	0.00	*	0.00	*	0.00	*
5	0.00	*	*	0.00	*	0.00	*	0.00	*
6	439	650	378	448	170	204	38	45	45
7	686	580	337	625	150	284	34	63	40
8	58	1270	740	116	340	53	73	11	88
9	25	3340	1950	132	920	62	180	12	230
10	15	3800	2220	90	1100	43	200	8.2	260
11	5700	421	245	3770	110	1710	25	380	29
12	682	680	396	729	180	332	40	73	47
13	134	1260	734	266	340	122	72	26	88
14	44	2130	1240	148	580	69	120	14	150
15	33	2790	1630	145	770	68	150	14	190
16	53	1540	898	128	410	59	88	13	110
17	24	2810	1640	106	770	50	150	10	190
18	16	2880	1680	73	790	34	160	6.8	200
19	14	2950	1720	65	810	31	160	6.1	200
20	12	3050	1780	58	840	27	170	5.4	210
21	10	3200	1870	51	880	24	170	4.7	220
22	13	3400	1990	70	940	33	180	6.5	240
23	10	3800	2220	60	1100	29	200	5.5	260
24	7.3	4000	2340	46	1100	22	210	4.2	280
25	5.9	4100	2400	38	1100	18	220	3.5	280
26	5.2	4800	2820	40	1400	19	250	3.5	330
27	4.1	5400	3170	35	1500	17	280	3.1	370
28	3.8	5800	3410	35	1700	17	290	3.0	400
29	3.5	6200	3650	34	1800	17	310	2.9	430
30	3.5	7000	4120	39	2000	19	340	3.2	480
31	2.9	9000	5320	42	2700	21	410	3.2	610
TOTAL	8004.20	**	**	7390	**	3390	**	731	**
WEIGHTED AVERAGE	258	587	342	**	160	**	34	**	41

TABLE 2.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSTITUENTS OR PROPERTIES FOR DOUBLE MOUNTAIN FORK BRAZOS RIVER NEAR ASPERMONT, TEXAS (08080500), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCTANCE (MICROMHOS)	DISSOLVED SOLIDS (MG/L)	DISSOLVED SOLIDS (TONS)	DISSOLVED CHLORIDE (MG/L)	DISSOLVED CHLORIDE (TONS)	DISSOLVED SULFATE (MG/L)	DISSOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	11	8070	5430	161	1900	56	1600	48	2100
2	9.6	6820	4540	118	1500	39	1400	36	1700
3	8.4	5600	3680	84	1200	26	1200	27	1300
4	7.3	5830	3840	76	1200	24	1200	24	1400
5	5.9	6340	4200	67	1400	22	1300	21	1500
6	5.0	6560	4350	59	1400	19	1300	18	1600
7	21	5210	3420	194	1100	60	1100	62	1200
8	560	2170	1380	2090	370	563	480	730	480
9	305	1380	874	719	230	186	310	256	300
10	183	1250	788	390	200	100	280	139	270
11	154	1300	822	342	210	88	290	122	280
12	254	1350	854	586	220	151	300	209	290
13	4810	1030	650	8440	160	2140	230	3040	220
14	1550	1010	637	2670	160	674	230	960	210
15	798	1310	829	1790	210	459	300	638	280
16	577	1650	1050	1630	270	427	370	577	360
17	415	1800	1140	1280	300	338	400	452	390
18	340	2170	1380	1270	370	342	480	443	480
19	300	2400	1530	1240	420	338	530	431	530
20	252	2880	1850	1260	520	350	630	431	640
21	235	2610	1670	1060	460	292	580	366	580
22	213	2720	1740	1000	480	277	600	345	600
23	184	2790	1790	889	500	247	610	305	620
24	154	3000	1930	802	540	225	660	274	670
25	140	3190	2050	776	580	220	700	264	720
26	135	3380	2180	794	620	227	740	268	760
27	110	3480	2250	667	640	191	760	225	790
28	104	3610	2330	655	670	189	780	220	820
29	97	3740	2420	634	700	184	810	212	850
30	96	3870	2510	650	730	190	840	217	890
31	96	3970	2570	667	750	196	860	222	910
TOTAL	12130.2	**	**	33100	**	8830	**	11600	**
WEIGHTED AVERAGE	391	1580	1010	**	270	**	350	**	350

TABLE 3.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR SALT FORK BRAZOS RIVER NEAR PEACOCK, TEXAS (08081000), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	0.21	35500	23200	13	12100	6.8	2400	1.4	*
2	0.23	35600	23300	14	12100	7.5	2400	1.5	*
3	0.18	35800	23400	11	12200	5.9	2400	1.2	*
4	0.17	36000	23600	11	12300	5.6	2400	1.1	*
5	0.42	29200	19000	22	9700	11	2100	2.4	*
6	1.7	36400	23800	109	12400	57	2400	11	*
7	3.2	35800	23400	202	12200	105	2400	21	*
8	28	45500	30000	2270	15900	1210	2800	209	*
9	35	7980	5110	483	2500	235	680	64	800
10	16	9330	5980	258	2900	126	790	34	930
11	127	9270	5940	2040	2900	996	780	269	920
12	5640	4210	2690	40900	1300	19800	370	5640	430
13	2800	3130	2000	15100	960	7260	280	2100	320
14	632	4990	3190	5440	1500	2630	440	745	510
15	375	7070	4520	4580	2200	2230	610	617	710
16	349	10600	6800	6410	3300	3140	890	837	*
17	260	13800	8880	6230	4400	3080	1100	791	*
18	153	18800	12100	5020	6100	2510	1500	609	*
19	104	19000	12300	3450	6100	1720	1500	417	*
20	76	23200	15000	3090	7600	1560	1800	359	*
21	72	23100	15000	2910	7600	1470	1700	339	*
22	88	23800	15400	3670	7800	1860	1800	425	*
23	63	26100	17000	2880	8600	1470	1900	327	*
24	52	27000	17500	2460	8900	1260	2000	277	*
25	46	28200	18300	2280	9400	1170	2000	253	*
26	42	29200	19000	2160	9700	1100	2100	237	*
27	39	30100	19600	2060	10100	1060	2100	225	*
28	37	34200	22400	2230	11600	1160	2300	233	*
29	34	34000	22200	2040	11500	1060	2300	213	*
30	31	34100	22300	1870	11600	967	2300	195	*
31	30	34000	22200	1800	11500	933	2300	188	*
TOTAL	11135.11	**	**	122000	**	60100	**	15600	**
WEIGHTED AVERAGE	359	6310	4060	**	2000	**	520	**	620

TABLE 4.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR CROTON CREEK NEAR JAYTON, TEXAS (08081200), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	0.36	18500	12600	12	5600	5.4	2400	2.3	*
2	0.30	20000	13600	11	6100	4.9	2500	2.0	*
3	0.24	22600	15300	9.9	7000	4.6	2600	1.7	*
4	0.24	24700	16700	11	7800	5.0	2700	1.8	*
5	0.99	22200	15100	40	6900	18	2600	6.9	*
6	0.24	25500	17200	11	8100	5.2	2800	1.8	*
7	5.2	20800	14100	199	6400	90	2500	35	*
8	2.8	21500	14600	110	6600	50	2600	19	*
9	1.3	22100	15000	53	6800	24	2600	9.1	*
10	1.0	23000	15600	42	7200	19	2600	7.1	*
11	842	1710	1320	3000	220	501	670	1530	690
12	815	1950	1510	3310	250	553	770	1690	790
13	203	2500	1930	1060	320	177	980	539	1000
14	77	3400	2630	546	440	91	1300	278	1400
15	42	4900	3680	417	830	94	1600	184	1700
16	29	5200	3880	304	930	73	1600	128	1700
17	20	6000	4400	238	1200	65	1700	91	1800
18	15	8500	6040	245	2100	84	1800	74	2000
19	13	10100	7090	249	2600	92	1900	67	*
20	12	14100	9730	315	4000	131	2100	69	*
21	10	16400	11200	303	4800	131	2300	61	*
22	9.0	19500	13300	323	5900	144	2400	59	*
23	9.6	20700	14100	365	6400	165	2500	65	*
24	9.6	23700	16100	416	7400	192	2700	69	*
25	9.0	23900	16200	393	7500	182	2700	65	*
26	9.0	24200	16400	398	7600	185	2700	66	*
27	7.8	24600	16600	351	7700	163	2700	57	*
28	5.3	25200	17000	244	7900	114	2800	40	*
29	4.1	25700	17400	192	8100	90	2800	31	*
30	3.1	25900	17500	147	8200	69	2800	23	*
31	2.8	26300	17800	134	8300	63	2800	21	*
TOTAL	2159.97	**	**	13500	**	3580	**	5290	**
WEIGHTED AVERAGE	69.7	3130	2310	**	610	**	910	**	960

TABLE 5.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR SALT FORK BRAZOS RIVER NEAR ASPERMONT, TEXAS (08082000), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCTANCE (MICROMHOS)	DISSOLVED SOLIDS (MG/L)	DISSOLVED SOLIDS (TONS)	DISSOLVED CHLORIDE (MG/L)	DISSOLVED CHLORIDE (TONS)	DISSOLVED SULFATE (MG/L)	DISSOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	1.7	36100	23400	107	12200	56	2300	10	*
2	1.3	45200	29900	105	15900	56	2600	9.3	*
3	0.98	51300	34300	91	18400	49	2800	7.5	*
4	0.86	53300	35800	83	19300	45	2900	6.7	*
5	1.0	57000	38500	104	20900	56	3000	8.1	*
6	1.1	58800	39900	119	21700	64	3000	9.0	*
7	10	40400	26400	714	13900	376	2500	66	*
8	6.9	45000	29700	554	15800	294	2600	49	*
9	11	65200	44800	1330	24600	731	3100	93	*
10	23	44000	29000	1800	15400	955	2600	161	*
11	430	18300	11400	13300	5800	6700	1300	1530	*
12	2780	4580	2780	20900	1400	10200	360	2720	440
13	3950	3130	1890	20200	920	9860	250	2670	310
14	745	6070	3690	7430	1800	3650	480	957	580
15	462	6650	4050	5060	2000	2490	520	648	640
16	355	9380	5750	5510	2800	2730	720	690	890
17	282	12000	7400	5630	3700	2810	900	689	*
18	222	14800	9180	5500	4600	2760	1100	656	*
19	185	17200	10700	5360	5400	2700	1300	625	*
20	163	18600	11600	5120	5900	2590	1300	589	*
21	139	20300	12700	4780	6500	2420	1400	542	*
22	130	21900	13800	4840	7000	2460	1500	541	*
23	118	25000	15800	5050	8100	2580	1700	547	*
24	106	25600	16200	4650	8300	2380	1800	501	*
25	93	26000	16500	4150	8500	2130	1800	445	*
26	80	27800	17700	3830	9100	1970	1900	404	*
27	73	28200	18000	3550	9300	1830	1900	373	*
28	66	28800	18400	3280	9500	1690	1900	343	*
29	61	29500	18900	3110	9700	1600	2000	323	*
30	57	30500	19600	3010	10100	1560	2000	309	*
31	52	30900	19800	2780	10300	1440	2000	285	*
TOTAL	10606.84	**	**	142000	**	71200	**	16800	**
WEIGHTED AVERAGE	342	7980	4960	**	2500	**	590	**	730

TABLE 6.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR NORTH CROTON CREEK NEAR KNOX CITY, TEXAS (08082180), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	5.0	15200	10500	142	4300	59	2400	32	*
2	4.2	17500	12100	137	5100	58	2600	29	*
3	3.7	19400	13300	133	5800	58	2700	27	*
4	3.4	20600	14100	129	6200	57	2800	25	*
5	3.0	21000	14400	116	6400	52	2800	23	*
6	2.8	21300	14600	110	6500	49	2800	21	*
7	2.5	22100	15100	102	6800	46	2800	19	*
8	2.1	23000	15700	89	7100	40	2900	16	*
9	1.9	24000	16300	84	7500	38	2900	15	*
10	1.8	24900	16900	82	7800	38	2900	14	*
11	18	21600	14800	717	6600	320	2800	136	*
12	381	1520	1080	1120	370	384	330	339	390
13	76	1810	1290	265	450	91	390	80	460
14	28	3320	2360	178	830	63	690	52	820
15	16	7260	5120	221	1900	82	1400	60	1700
16	12	11800	8230	267	3300	106	2000	66	*
17	8.3	14600	10100	227	4200	93	2300	52	*
18	6.1	18100	12500	205	5300	88	2600	43	*
19	4.4	18000	12400	147	5300	63	2600	31	*
20	2.9	18200	12500	98	5400	42	2600	21	*
21	2.3	19500	13400	83	5800	36	2700	17	*
22	2.6	19600	13400	94	5900	41	2700	19	*
23	2.3	20700	14200	88	6300	39	2800	17	*
24	1.9	21800	14900	76	6700	34	2800	14	*
25	1.8	22100	15100	73	6800	33	2800	14	*
26	1.8	22800	15500	75	7000	34	2800	14	*
27	1.7	23400	15900	73	7300	33	2900	13	*
28	1.7	24000	16300	75	7500	34	2900	13	*
29	1.6	24800	16800	73	7800	34	2900	12	*
30	1.6	25000	16900	73	7900	34	2900	12	*
31	1.5	25400	17200	70	8000	33	2900	12	*
TOTAL	603.9	**	**	5420	**	2210	**	1260	**
WEIGHTED AVERAGE	19.5	4790	3320	**	1400	**	770	**	970

TABLE 7.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER AT SEYMOUR, TEXAS (08082500), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	41	24900	16200	1800	8300	914	1900	212	*
2	25	24000	15600	1050	7900	531	1900	129	*
3	19	22400	14500	745	7200	369	1900	97	*
4	10	22300	14400	390	7200	193	1900	51	*
5	5.5	20900	13500	200	6600	98	1900	28	*
6	3.7	18400	11800	118	5600	56	1800	18	*
7	55	8040	5020	746	2100	315	1000	154	1200
8	17	3270	2020	93	800	37	470	22	520
9	4.3	9360	5870	68	2500	29	1200	14	1300
10	55	6390	3980	591	1600	244	860	127	960
11	201	3770	2330	1260	930	504	540	291	590
12	165	2540	1560	697	610	273	370	165	410
13	9850	4100	2540	67500	1000	27000	580	15400	640
14	8060	2320	1430	31100	560	12100	340	7420	370
15	2990	2440	1500	12100	590	4750	360	2890	390
16	1800	2360	1450	7060	570	2760	350	1680	380
17	1450	2970	1830	7170	720	2830	430	1680	470
18	1050	3830	2370	6710	940	2680	540	1540	600
19	736	3840	2370	4720	950	1880	550	1090	600
20	561	4900	3040	4600	1200	1860	680	1030	750
21	477	5600	3480	4480	1400	1830	770	986	850
22	381	6350	3950	4060	1600	1680	850	878	950
23	341	7000	4360	4020	1800	1670	930	853	1000
24	319	7550	4710	4060	2000	1700	990	850	1100
25	277	7630	4760	3560	2000	1500	1000	744	1100
26	237	8300	5190	3320	2200	1410	1100	682	1200
27	215	8920	5590	3240	2400	1380	1100	655	1300
28	202	9920	6230	3400	2700	1470	1200	667	1400
29	192	10000	6280	3260	2700	1410	1200	638	*
30	179	10100	6350	3070	2700	1330	1200	599	*
31	168	11100	6990	3170	3100	1390	1300	603	*
TOTAL	30086.5	**	**	188000	**	76300	**	42200	**
WEIGHTED AVERAGE	971	3740	2320	**	940	**	520	**	570

TABLE 8.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR CLEAR FORK BRAZOS RIVER AT HAWLEY, TEXAS (08083240), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	29	5360	3830	300	900	71	1600	122	1500
2	28	5380	3850	291	910	69	1600	118	1500
3	28	5270	3760	285	890	67	1500	115	1500
4	28	5210	3720	281	870	66	1500	114	1400
5	27	5100	3630	265	850	62	1500	107	1400
6	26	4810	3410	239	790	56	1400	96	1300
7	29	4750	3360	263	780	61	1400	106	1300
8	39	5190	3700	390	870	92	1500	158	1400
9	27	2680	1840	134	410	30	720	52	810
10	22	2730	1870	111	420	25	730	43	830
11	21	2820	1940	110	430	24	760	43	850
12	21	3620	2520	143	570	32	1000	57	1100
13	183	2500	1710	844	380	186	670	329	760
14	719	874	582	1130	120	239	220	428	280
15	120	1020	680	220	140	47	260	84	330
16	45	1930	1310	159	280	35	500	61	600
17	54	1510	1020	148	220	32	390	57	480
18	36	1810	1220	119	270	26	470	46	570
19	25	1640	1110	75	240	16	420	29	520
20	23	1900	1290	80	280	17	500	31	590
21	22	2390	1630	97	360	21	630	38	730
22	24	2300	1570	102	340	22	610	39	710
23	36	2200	1500	145	330	32	580	56	680
24	40	1900	1290	139	280	30	500	54	590
25	27	2300	1570	114	340	25	610	44	710
26	23	2850	1960	122	440	27	770	48	860
27	23	3020	2080	129	470	29	820	51	910
28	22	3360	2330	138	520	31	920	55	1000
29	21	3680	2560	145	580	33	1000	58	1100
30	20	4180	2930	158	670	36	1200	63	1200
31	20	4310	3030	164	700	38	1200	65	1200
TOTAL	1808	**	**	7040	**	1580	**	2770	**
WEIGHTED AVERAGE	58.3	2090	1440	**	320	**	570	**	630

TABLE 9.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR CLEAR FORK BRAZOS RIVER AT FORT GRIFFIN, TEXAS (08085500), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	22	2090	1400	83	420	25	630	37	*
2	21	2090	1400	79	420	24	630	36	*
3	19	2100	1410	72	420	22	630	33	*
4	19	2110	1410	72	430	22	640	33	*
5	20	2160	1440	78	440	24	650	35	*
6	22	2220	1480	88	450	27	670	40	*
7	38	2240	1490	153	450	47	680	70	*
8	37	2170	1450	145	440	44	660	66	*
9	41	1940	1300	144	390	43	580	65	*
10	49	1830	1230	163	370	49	550	73	*
11	66	1590	1080	192	320	57	480	85	*
12	100	1400	951	257	280	75	420	113	*
13	2100	1060	725	4110	210	1180	310	1780	*
14	2930	1500	1020	8040	300	2360	450	3540	*
15	3460	537	371	3470	100	972	160	1470	*
16	4580	718	494	6110	140	1730	210	2620	*
17	1680	786	540	2450	150	696	230	1050	*
18	835	810	557	1250	160	357	240	539	*
19	570	796	547	842	160	239	230	361	*
20	403	832	571	622	160	177	250	267	*
21	277	865	594	444	170	126	260	191	*
22	231	908	623	388	180	111	270	167	*
23	200	1010	691	373	200	107	300	161	*
24	242	1140	778	508	220	147	340	221	*
25	229	1520	1030	637	300	187	450	281	*
26	242	1170	798	522	230	151	350	227	*
27	187	1060	725	366	210	105	310	159	*
28	151	1070	731	298	210	86	320	129	*
29	138	1050	718	268	210	77	310	116	*
30	129	1120	765	266	220	77	330	116	*
31	121	1190	811	265	230	77	350	115	*
TOTAL	19159	**	**	32800	**	9420	**	14200	**
WEIGHTED AVERAGE	618	926	633	**	180	**	270	**	*

TABLE 10.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR NORTH FORK HUBBARD CREEK NEAR ALBANY, TEXAS (08086150), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	0.27	4790	2610	1.9	1400	1.0	140	0.10	1100
2	0.24	4840	2640	1.7	1400	0.9	140	0.09	1100
3	0.24	4800	2620	1.7	1400	0.9	140	0.09	1100
4	0.27	4790	2610	1.9	1400	1.0	140	0.10	1100
5	0.30	4780	2610	2.1	1400	1.2	140	0.10	1100
6	0.34	4760	2600	2.4	1400	1.3	140	0.10	1100
7	1.3	4780	2610	9.2	1400	5.0	140	0.50	1100
8	1.2	4900	2670	8.7	1500	4.7	150	0.50	1100
9	0.78	4910	2680	5.6	1500	3.1	150	0.30	1100
10	0.67	4970	2710	4.9	1500	2.7	150	0.30	1100
11	0.67	4980	2710	4.9	1500	2.7	150	0.30	1100
12	7.5	3940	2170	44	1200	24	120	2.4	890
13	187	2190	1220	617	640	321	64	32	490
14	20	1620	908	49	470	25	47	2.6	360
15	5.2	2190	1220	17	640	8.9	64	0.90	490
16	4.6	2730	1520	19	800	9.9	80	1.0	610
17	2.5	2720	1510	10	790	5.4	80	0.50	610
18	1.7	2740	1520	7.0	800	3.7	80	0.40	620
19	1.5	2810	1560	6.3	820	3.3	82	0.30	630
20	2.1	2960	1640	9.3	870	4.9	87	0.50	670
21	2.0	2970	1650	8.9	870	4.7	87	0.50	670
22	5.7	3450	1900	29	1000	16	100	1.6	780
23	2.6	3460	1910	13	1000	7.1	100	0.70	780
24	1.8	3430	1890	9.2	1000	4.9	100	0.50	780
25	1.4	3500	1930	7.3	1000	3.9	100	0.40	790
26	1.3	3450	1900	6.7	1000	3.6	100	0.40	780
27	1.3	3460	1910	6.7	1000	3.6	100	0.40	780
28	1.3	3480	1920	6.7	1000	3.6	100	0.40	790
29	1.3	3730	2050	7.2	1100	3.9	110	0.40	850
30	1.4	3630	2000	7.6	1100	4.0	110	0.40	820
31	1.2	3880	2130	6.9	1100	3.7	110	0.40	880
TOTAL	259.68	**	**	933	**	490	**	49	**
WEIGHTED AVERAGE	8.38	2390	1330	**	700	**	70	**	540

TABLE 11.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR HUBBARD CREEK BELOW ALBANY, TEXAS (08086212), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	0.00	*	*	0.00	*	0.00	*	0.00	*
2	0.00	3650	1990	0.00	1000	0.00	160	0.00	750
3	0.00	3600	1960	0.00	1000	0.00	150	0.00	740
4	0.00	*	*	0.00	*	0.00	*	0.00	*
5	0.00	*	*	0.00	*	0.00	*	0.00	*
6	0.00	*	*	0.00	*	0.00	*	0.00	*
7	1.0	3240	1760	4.8	910	2.5	140	0.40	670
8	1.2	3200	1740	5.6	900	2.9	140	0.40	660
9	0.71	3340	1820	3.5	940	1.8	140	0.30	690
10	4.0	3250	1770	19	920	9.9	140	1.5	670
11	4.3	3180	1730	20	890	10	140	1.6	660
12	3660	766	402	3980	200	2000	36	354	160
13	27500	276	144	10700	72	5350	13	974	58
14	11600	325	170	5310	85	2660	15	483	69
15	869	510	267	626	130	314	24	56	110
16	620	675	354	593	180	298	32	53	140
17	331	840	442	395	220	199	39	35	180
18	221	1020	538	321	270	162	47	28	210
19	160	1200	634	274	320	139	55	24	250
20	122	1380	731	241	370	122	63	21	290
21	101	1550	823	224	420	114	71	19	320
22	123	1320	699	232	350	118	61	20	280
23	205	1000	527	292	270	147	46	26	210
24	127	1260	666	229	340	116	58	20	260
25	82	1390	736	163	370	83	64	14	290
26	61	1450	769	127	390	64	66	11	300
27	46	1580	839	104	430	53	72	9.0	330
28	36	1640	872	85	440	43	75	7.3	340
29	33	1720	915	82	470	42	78	7.0	360
30	29	1900	1010	79	520	41	86	6.7	400
31	27	1970	1050	77	540	39	89	6.5	410
TOTAL	45964.21	**	**	24200	**	12100	**	2180	**
WEIGHTED AVERAGE	1483	372	195	**	98	**	18	**	78

TABLE 12.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BIG SANDY CREEK ABOVE BRECKENRIDGE, TEXAS (08086290), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	0.00	*	*	0.00	*	0.00	*	0.00	*
2	0.00	*	*	0.00	*	0.00	*	0.00	*
3	0.00	*	*	0.00	*	0.00	*	0.00	*
4	0.00	*	*	0.00	*	0.00	*	0.00	*
5	0.00	*	*	0.00	*	0.00	*	0.00	*
6	0.00	*	*	0.00	*	0.00	*	0.00	*
7	182	402	210	103	110	55	16	7.7	65
8	12	231	120	3.9	64	2.1	9.0	0.30	37
9	2.0	500	262	1.4	140	0.8	19	0.10	81
10	0.09	750	394	0.10	210	0.05	29	0.01	120
11	0.00	*	*	0.00	*	0.00	*	0.00	*
12	4910	125	65	863	35	461	4.9	64	20
13	28100	95	49	3750	26	2000	3.7	280	15
14	1420	402	210	806	110	431	16	60	65
15	258	706	370	258	200	138	27	19	110
16	63	900	473	81	250	43	35	6.0	150
17	15	1080	569	23	310	12	42	1.7	180
18	33	1150	607	54	330	29	45	4.0	190
19	29	1360	719	56	390	30	53	4.1	220
20	16	1680	892	39	480	21	65	2.8	280
21	16	1750	930	40	500	22	68	2.9	290
22	150	775	407	165	220	88	30	12	130
23	268	427	223	162	120	86	17	12	69
24	85	699	367	84	200	45	27	6.2	110
25	47	719	377	48	200	26	28	3.5	120
26	29	1110	585	46	310	25	43	3.4	180
27	16	1420	752	32	400	17	55	2.4	230
28	9.5	1700	903	23	480	12	66	1.7	280
29	5.8	1800	957	15	510	8.1	70	1.1	300
30	5.4	2120	1130	17	610	8.9	83	1.2	350
31	5.4	2200	1180	17	630	9.2	86	1.3	360
TOTAL	35677.19	**	**	6690	**	3570	**	498	**
WEIGHTED AVERAGE	1151	133	69	**	37	**	5.2	**	22

TABLE 13.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR CLEAR FORK BRAZOS RIVER AT ELIASVILLE, TEXAS (08087300), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	15	3280	2050	83	650	26	600	24	870
2	15	3300	2060	84	650	26	600	24	880
3	13	3340	2090	73	660	23	610	22	890
4	11	3370	2120	63	670	20	620	19	900
5	11	3420	2150	64	680	20	640	19	910
6	15	3510	2220	90	700	28	670	27	940
7	56	3440	2170	328	680	103	650	98	920
8	87	3520	2230	524	700	164	670	158	940
9	54	4100	2680	391	820	120	880	128	1100
10	38	4270	2820	290	860	88	940	96	1200
11	38	4160	2730	280	830	86	900	92	1100
12	3780	2500	1490	15200	490	4970	380	3860	660
13	21800	250	128	7540	47	2750	16	939	63
14	26100	621	327	23000	120	8250	49	3420	160
15	22700	849	454	27800	160	9840	74	4530	220
16	21800	898	482	28400	170	10000	80	4700	230
17	21000	668	353	20000	130	7140	53	3030	170
18	18200	693	366	18000	130	6420	56	2760	180
19	13100	644	339	12000	120	4290	51	1800	160
20	6510	684	361	6350	130	2270	55	970	170
21	4480	683	361	4370	130	1560	55	666	170
22	3120	761	404	3410	140	1210	64	536	190
23	2930	765	407	3220	140	1140	64	507	200
24	2640	764	406	2890	140	1030	64	456	190
25	2500	752	399	2700	140	959	63	423	190
26	1970	761	404	2150	140	765	64	339	190
27	428	839	448	518	160	183	73	84	210
28	299	1050	569	459	200	161	100	80	270
29	245	1270	699	462	240	160	130	87	330
30	215	1460	813	472	280	162	160	94	380
31	192	1590	894	464	300	158	180	96	410
TOTAL	174362	**	**	182000	**	64100	**	30100	**
WEIGHTED AVERAGE	5625	720	386	**	140	**	64	**	180

TABLE 14.--ESTIMATED DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER NEAR SOUTH BEND, TEXAS (08088000), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCTANCE (MICROMHOS)	DISSOLVED SOLIDS (MG/L)	DISSOLVED SOLIDS (TONS)	DISSOLVED CHLORIDE (MG/L)	DISSOLVED CHLORIDE (TONS)	DISSOLVED SULFATE (MG/L)	DISSOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	33	4750	2880	257	1100	102	630	56	870
2	44	4850	2940	350	1200	140	640	76	890
3	69	5620	3430	638	1400	261	720	135	990
4	57	5400	3290	506	1300	205	700	108	960
5	47	4800	2910	369	1200	148	640	81	880
6	43	4600	2790	323	1100	128	620	71	850
7	90	5800	3540	860	1500	353	740	180	1000
8	143	5250	3190	1230	1300	498	690	265	940
9	568	3920	2360	3620	920	1410	540	824	740
10	241	4700	2850	1850	1100	738	630	408	860
11	138	5290	3220	1200	1300	485	690	257	950
12	2690	2820	1690	12300	640	4630	400	2920	560
13	25300	1120	663	45300	240	16200	170	11500	240
14	36300	1000	592	58000	210	20700	150	14800	210
15	39100	900	532	56200	190	20000	140	14400	190
16	32900	1040	615	54700	220	19500	160	14000	220
17	27400	1090	645	47700	230	17100	160	12200	230
18	22800	1130	669	41200	240	14800	170	10500	240
19	17100	1180	699	32300	250	11600	180	8200	250
20	9290	1440	854	21400	310	7760	210	5390	300
21	5030	1780	1060	14400	390	5260	260	3570	370
22	3150	2000	1190	10100	440	3730	290	2490	410
23	2730	2500	1490	11000	560	4120	360	2650	500
24	2340	2900	1740	11000	660	4150	410	2600	570
25	2130	2960	1770	10200	670	3870	420	2410	580
26	1920	3030	1820	9420	690	3580	430	2220	600
27	1110	3400	2040	6120	780	2350	470	1420	660
28	850	3600	2170	4970	840	1920	500	1150	690
29	732	3650	2200	4340	850	1680	510	999	700
30	660	3800	2290	4080	890	1580	520	933	720
31	606	3870	2330	3820	910	1490	530	870	740
TOTAL	235611	**	**	470000	**	170500	**	117700	**
WEIGHTED AVERAGE	7600	1240	738	**	270	**	190	**	260

TABLE 15.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER AT MORRIS SHEPPARD DAM NEAR GRAFORD, TEXAS (08088600), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	20	2700	1560	84	630	34	300	16	450
2	20	2700	1560	84	630	34	300	16	450
3	477	2700	1560	2010	630	810	300	389	450
4	20	2700	1560	84	630	34	300	16	450
5	20	2710	1570	85	630	34	300	16	450
6	946	2710	1570	4010	630	1610	300	776	450
7	20	2710	1570	85	630	34	300	16	450
8	20	2710	1570	85	630	34	300	16	450
9	20	2710	1570	85	630	34	300	16	450
10	111	2700	1560	468	630	189	300	91	450
11	20	2700	1560	84	630	34	300	16	450
12	5390	2670	1540	22500	620	9050	300	4340	450
13	46700	2650	1530	193000	620	77700	300	37300	440
14	54400	2530	1460	214000	590	86100	280	41200	420
15	48400	2250	1290	169000	520	67400	240	32000	380
16	51500	1980	1130	157000	450	62500	210	29500	340
17	34700	1700	966	90500	380	35800	180	16700	290
18	26000	1580	895	62900	350	24800	160	11600	270
19	25400	1580	895	61400	350	24200	160	11300	270
20	25600	1510	855	59100	340	23300	160	10800	260
21	16600	1240	698	31300	270	12300	130	5660	210
22	2860	1190	669	5170	260	2020	120	933	200
23	2770	1230	692	5180	270	2030	130	936	210
24	2770	1250	704	5260	280	2060	130	953	210
25	2660	1280	721	5180	280	2030	130	939	220
26	2190	1300	733	4330	290	1700	130	786	220
27	2410	1360	768	4990	300	1960	140	909	230
28	2180	1340	756	4450	300	1750	140	809	230
29	2390	1330	750	4840	290	1900	140	879	230
30	1910	1350	762	3930	300	1540	140	714	230
31	1540	1310	739	3070	290	1210	130	557	220
TOTAL	360064	**	**	1115000	**	444100	**	210200	**
WEIGHTED AVERAGE	11615	2000	1150	**	460	**	220	**	340

TABLE 16.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER NEAR DENNIS, TEXAS (08090800), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCTANCE (MICROMHOS)	DISSOLVED SOLIDS (MG/L)	DISSOLVED SOLIDS (TONS)	DISSOLVED CHLORIDE (MG/L)	DISSOLVED CHLORIDE (TONS)	DISSOLVED SULFATE (MG/L)	DISSOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	610	2990	1730	2850	700	1150	350	568	510
2	597	2920	1680	2710	680	1090	340	541	500
3	234	2890	1660	1050	670	422	330	210	500
4	110	2920	1680	500	680	201	340	100	500
5	62	2890	1660	279	670	112	330	56	500
6	135	2830	1630	593	650	237	320	118	490
7	388	1870	1030	1080	400	422	200	214	340
8	1350	2140	1200	4360	470	1710	240	863	380
9	916	2110	1180	2910	460	1140	230	577	380
10	305	1970	1090	901	430	352	220	178	350
11	127	1720	945	324	370	126	190	64	310
12	19000	256	132	6790	49	2500	26	1320	49
13	57800	200	103	16100	38	5920	20	3120	39
14	87900	1170	629	149000	240	56800	120	29200	220
15	73600	2200	1230	245000	480	96400	240	48500	390
16	52300	2010	1120	158000	440	61700	220	31200	360
17	51500	1880	1040	145000	410	56300	210	28600	340
18	40300	1690	928	101000	360	39100	180	19900	310
19	27300	1680	922	68000	360	26300	180	13400	300
20	26900	1630	893	64800	350	25100	180	12800	300
21	25600	1490	811	56100	310	21600	160	11000	270
22	21200	1230	663	37900	250	14500	130	7440	230
23	9850	1050	561	14900	210	5660	110	2920	200
24	5520	973	519	7730	200	2920	100	1510	180
25	4500	1340	725	8810	280	3370	140	1730	250
26	4140	1500	817	9130	310	3520	160	1800	270
27	3420	1490	811	7490	310	2880	160	1470	270
28	3420	1510	823	7600	320	2930	160	1490	280
29	3200	1490	811	7010	310	2700	160	1380	270
30	3240	1450	788	6900	300	2650	150	1360	270
31	15700	348	181	7660	67	2830	35	1490	67
TOTAL	541224	**	**	1142830	**	442600	**	225200	**
WEIGHTED AVERAGE	17459	1420	782	**	300	**	150	**	260

TABLE 17.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER AT WHITNEY DAM NEAR WHITNEY, TEXAS (08092600), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	63	1970	1110	189	420	72	210	36	350
2	48	1970	1110	144	420	55	210	27	350
3	678	1980	1120	2050	430	781	210	387	360
4	788	1970	1110	2370	420	902	210	447	350
5	756	1970	1110	2270	420	866	210	429	350
6	2090	1970	1110	6290	420	2390	210	1190	350
7	245	1930	1090	721	410	274	200	135	350
8	62	1960	1110	185	420	71	210	35	350
9	44	1970	1110	132	420	50	210	25	350
10	205	1970	1110	617	420	235	210	116	350
11	85	1960	1110	254	420	97	210	48	350
12	48	1960	1110	144	420	55	210	27	350
13	2330	1960	1110	6970	420	2650	210	1310	350
14	5250	1960	1110	15700	420	5970	210	2960	350
15	11400	1960	1110	34100	420	13000	210	6420	350
16	21400	1960	1110	64000	420	24400	210	12100	350
17	21100	1970	1110	63500	420	24200	210	12000	350
18	16200	1980	1120	49000	430	18700	210	9240	360
19	19000	1920	1080	55600	410	21100	200	10400	350
20	21900	1900	1070	63400	410	24000	200	11900	340
21	21900	1880	1060	62600	400	23700	200	11700	340
22	20200	1930	1090	59400	410	22600	200	11200	350
23	21900	1780	999	59100	380	22200	190	11000	330
24	22100	1580	880	52500	330	19400	160	9560	290
25	22100	1590	885	52800	330	19600	160	9630	300
26	22100	1550	862	51400	320	19000	160	9340	290
27	22100	1570	874	52100	320	19300	160	9490	290
28	21700	1540	856	50100	320	18500	160	9100	290
29	22400	1590	885	53600	330	19900	160	9760	300
30	18800	1630	909	46200	340	17200	170	8440	300
31	8230	1680	939	20900	350	7790	170	3830	310
TOTAL	347222	**	**	928000	**	348800	**	172200	**
WEIGHTED AVERAGE	11201	1760	990	**	370	**	180	**	320

TABLE 18.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER NEAR HIGHBANK, TEXAS (08098290), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCTANCE (MICROMHOS)	DISSOLVED SOLIDS (MG/L)	DISSOLVED SOLIDS (TONS)	DISSOLVED CHLORIDE (MG/L)	DISSOLVED CHLORIDE (TONS)	DISSOLVED SULFATE (MG/L)	DISSOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	1150	1750	989	3070	340	1060	180	571	350
2	807	1780	1010	2190	350	765	190	408	360
3	444	1800	1020	1220	360	428	190	227	360
4	345	1820	1030	959	360	338	190	178	360
5	446	1830	1030	1250	370	440	190	232	360
6	820	1700	960	2120	330	727	180	395	350
7	1310	1650	931	3290	310	1110	170	612	340
8	2120	1400	787	4510	250	1430	150	837	310
9	1590	1500	845	3630	270	1180	160	674	320
10	1230	1450	816	2710	260	869	150	503	320
11	1130	1400	787	2400	250	760	150	446	310
12	968	1350	759	1980	240	619	140	368	300
13	1070	1300	730	2110	220	650	140	391	290
14	10000	1860	1050	28400	370	10100	200	5290	370
15	7810	1850	1050	22100	370	7830	190	4110	360
16	12000	1900	1080	34800	390	12500	200	6490	370
17	25000	1910	1080	73000	390	26300	200	13600	370
18	27100	1920	1090	79500	390	28700	200	14800	370
19	21100	1940	1100	62600	400	22700	200	11700	370
20	21200	1890	1070	61200	380	21900	200	11400	370
21	26600	1810	1020	73500	360	25800	190	13700	360
22	27600	1680	948	70700	320	24100	180	13100	350
23	23900	1360	764	49300	240	15400	140	9160	300
24	24700	1310	736	49100	230	15200	140	9110	290
25	28200	1310	736	56000	230	17300	140	10400	290
26	27600	1280	719	53500	220	16400	130	9940	290
27	27100	1240	696	50900	210	15400	130	9450	280
28	26500	1210	679	48600	200	14600	130	9010	280
29	26000	1190	667	46800	200	14000	120	8690	280
30	25800	1200	673	46900	200	14000	120	8700	280
31	23300	1200	673	42300	200	12700	120	7850	280
TOTAL	424940	**	**	981000	**	325300	**	182400	**
WEIGHTED AVERAGE	13708	1520	855	**	280	**	160	**	320

TABLE 19.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER NEAR COLLEGE STATION, TEXAS (08109500), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	1020	1470	839	2310	270	740	150	426	320
2	1070	1490	851	2460	270	793	160	455	330
3	1150	1550	887	2760	290	907	170	513	330
4	771	1610	924	1920	310	646	170	360	340
5	628	1480	845	1430	270	460	160	265	320
6	1130	859	479	1460	120	365	83	253	230
7	1310	702	389	1380	90	318	66	234	200
8	1490	1000	561	2260	150	601	98	396	260
9	2820	1470	839	6390	270	2050	150	1180	320
10	2600	1230	696	4890	200	1430	130	879	290
11	2750	1290	732	5430	220	1630	130	984	300
12	2010	664	368	2000	83	452	62	337	190
13	1590	600	332	1420	73	312	56	239	170
14	10300	251	137	3810	24	672	22	611	80
15	31300	289	158	13300	29	2420	25	2150	91
16	20800	365	200	11200	38	2140	33	1830	110
17	20800	950	532	29900	140	7780	93	5220	250
18	27400	1540	881	65200	290	21400	160	12100	330
19	27300	1690	972	71700	340	24700	180	13500	340
20	24300	1750	1010	66200	350	23300	190	12600	350
21	25100	1770	1020	69200	360	24500	190	13200	350
22	26900	1710	985	71500	340	24800	190	13500	340
23	26800	1720	991	71700	340	25000	190	13600	340
24	24500	1680	966	63900	330	22000	180	12000	340
25	25800	1600	918	63900	310	21400	170	12000	330
26	26100	1520	869	61300	280	20000	160	11400	330
27	25700	1540	881	61200	290	20100	160	11400	330
28	25500	1510	863	59400	280	19300	160	11000	330
29	25200	1510	863	58700	280	19100	160	10900	330
30	25200	1490	851	57900	270	18700	160	10700	330
31	27000	1420	809	59000	250	18600	150	10800	320
TOTAL	466339	**	**	995000	**	326300	**	184900	**
WEIGHTED AVERAGE	15043	1380	790	**	260	**	150	**	300

TABLE 20.--DAILY AND MONTHLY MEANS AND LOADS FOR DISCHARGE, SPECIFIC CONDUCTANCE, AND SELECTED DISSOLVED CONSITUENTS OR PROPERTIES FOR BRAZOS RIVER NEAR RICHMOND, TEXAS (08114000), OCTOBER 1981

[CFS = cubic feet per second; MG/L = milligrams per liter; MICROMHOS = micromhos per centimeter at 25° Celsius]

MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCT-ANCE (MICRO-MHOS)	DIS-SOLVED SOLIDS (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1981									
1	1530	671	370	1530	83	345	62	258	190
2	1450	656	361	1410	81	317	61	239	190
3	1290	652	359	1250	80	279	61	211	180
4	1430	643	354	1370	79	304	60	231	180
5	1550	729	402	1680	94	393	68	285	200
6	1840	731	403	2000	94	468	68	339	200
7	1820	770	424	2090	100	499	72	354	210
8	1840	808	446	2210	110	541	76	376	220
9	1840	1190	658	3270	190	967	110	565	280
10	2220	1230	681	4080	200	1230	120	706	280
11	2610	1120	619	4360	180	1250	110	751	270
12	3010	950	525	4260	140	1120	90	729	240
13	3590	809	446	4320	110	1060	76	735	220
14	3490	565	311	2930	66	620	52	493	160
15	3250	1040	575	5040	160	1390	99	865	260
16	7730	750	413	8630	98	2040	70	1460	210
17	23200	395	217	13600	41	2560	36	2270	120
18	21200	305	167	9580	30	1690	28	1590	96
19	22400	292	160	9690	28	1690	27	1610	92
20	27600	704	388	28900	89	6660	66	4890	200
21	27900	1330	737	55500	230	17400	130	9640	290
22	26100	1440	799	56300	260	18500	140	9820	310
23	27100	1490	827	60500	280	20300	140	10600	310
24	29400	1520	844	67000	290	22700	150	11700	310
25	30000	1450	804	65100	270	21500	140	11400	310
26	28700	1460	810	62800	270	20800	140	11000	310
27	28900	1410	782	61000	250	19800	140	10600	300
28	28500	1400	776	59700	250	19300	140	10400	300
29	27300	1370	759	56000	240	17900	130	9730	300
30	26100	1410	782	55100	250	17900	140	9600	300
31	26000	1430	793	55700	260	18200	140	9700	300
TOTAL	440890	**	**	767000	**	240000	**	133100	**
WEIGHTED AVERAGE	14222	1160	644	**	200	**	110	**	260

TABLE 21--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, AUGUST 4, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

324932098575101 HUBBARD CREEK RESERVOIR SITE P1

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
AUG										
04...	1420	1.00	1080	7.9	30.5	2.00	7.4	103	250	150
04...	1421	3.30	--	--	--	--	--	--	--	--
04...	1422	10.0	1080	7.9	29.5	--	7.1	96	--	--
04...	1424	20.0	1080	7.8	29.0	--	6.6	88	--	--
04...	1426	30.0	1080	7.6	28.5	--	5.6	74	--	--
04...	1428	40.0	1090	7.4	28.5	--	4.7	62	--	--
04...	1430	50.0	1090	7.0	26.5	--	.2	3	--	--
04...	1433	64.0	1110	6.8	24.5	--	.0	0	260	130

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
AUG									
04...	68	19	120	3.5	8.6	97	44	270	.3
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	74	19	110	3.1	8.4	130	36	260	--

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)	ARSENIC DISSOLVED (UG/L AS AS)
AUG									
04...	2.9	591	.00	.73	.73	.010	<10	16	1
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	.00	1.30	1.3	.020	30	140	--
04...	--	--	.00	1.10	1.1	.030	340	1100	--
04...	6.6	595	.00	1.60	1.6	.050	1300	1400	7

DATE	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	LEAD, DISSOLVED (UG/L AS PB)	MERCURY DISSOLVED (UG/L AS HG)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)
AUG									
04...	250	<1	0	21	<10	.0	0	0	<3
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	250	<1	0	27	<10	.0	0	0	<3

324712098575701 HUBBARD CREEK RESERVOIR SITE P4

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
04...	1745	1.00	1090	7.9	28.5	7.6	100
04...	1749	10.0	1090	7.9	28.0	6.9	91
04...	1751	19.0	1100	7.6	28.0	5.5	72

TABLE 21--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, AUGUST 4, 1981--Continued

324843098582901 HUBBARD CREEK RESERVOIR SITE P6

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
04...	1805	1.00	1080	7.9	29.5	7.4	100
04...	1807	10.0	1080	7.9	29.0	7.4	99
04...	1809	20.0	1080	7.8	28.5	6.7	88
04...	1811	30.0	1080	7.7	28.5	6.2	82
04...	1813	40.0	1080	7.3	28.0	3.8	50
04...	1815	50.0	1090	6.9	26.0	.2	3
04...	1819	63.0	1110	6.8	24.5	.2	2

324649099000501 HUBBARD CREEK RESERVOIR SITE P9

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
04...	1830	1.00	1090	7.9	28.5	.80	7.3	96	250
04...	1832	10.0	1090	7.8	28.5	--	7.2	95	--
04...	1834	20.0	1090	7.7	28.0	--	6.3	83	--
04...	1836	30.0	1090	7.7	27.5	--	6.1	80	--
04...	1838	40.0	1090	7.5	27.5	--	4.8	63	--
04...	1840	47.0	1090	7.3	27.5	--	2.7	36	260

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
04...	150	70	19	110	3.2	7.6	100	47	260
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	160	71	19	110	3.2	8.1	100	45	260

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
04...	3.4	577	.00	1.30	1.3	.010	<10	10
04...	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--
04...	--	--	.00	1.00	1.0	.020	10	90
04...	--	--	.00	1.40	1.4	.020	30	280
04...	4.1	578	.00	1.20	1.2	.030	14	840

TABLE 21--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, AUGUST 4, 1981--Continued

324606099000201 HUBBARD CREEK RESERVOIR SITE P10

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
04...	1900	1.00	1090	7.9	28.5	7.7	101
04...	1902	10.0	1090	7.8	28.0	7.1	93
04...	1904	20.0	1090	7.7	27.5	6.3	83
04...	1906	30.0	1090	7.5	27.0	5.6	73
04...	1910	36.0	1090	7.5	27.0	5.5	71

324514099010201 HUBBARD CREEK RESERVOIR SITE P11

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
04...	1915	1.00	1090	7.9	28.0	7.4	97
04...	1917	10.0	1090	7.7	27.5	6.5	86
04...	1919	20.0	1090	7.6	27.5	5.9	78
04...	1921	28.0	1090	7.6	27.0	6.1	79

324301099001701 HUBBARD CREEK RESERVOIR SITE P12

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
04...	1930	1.00	1120	8.0	29.5	.30	8.5	115	260
04...	1932	5.00	1120	8.0	29.5	--	8.4	114	--
04...	1934	10.0	1110	7.5	27.5	--	5.6	74	--
04...	1935	14.0	1110	7.5	27.5	--	5.3	70	260

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
04...	150	74	19	120	3.4	8.6	110	46	260
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	150	72	19	110	3.2	8.4	110	46	260

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
04...	4.5	598	.00	1.10	1.1	.030	16	4
04...	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--
04...	4.2	586	.00	1.40	1.4	.060	16	52

TABLE 21--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, AUGUST 4, 1981--Continued

324949098594301 HUBBARD CREEK RESERVOIR SITE P13

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
04...	1500	1.00	1090	8.0	30.0	7.5	103
04...	1502	10.0	1090	8.0	29.5	7.5	101
04...	1504	20.0	1090	7.8	29.0	6.5	87
04...	1506	30.0	1090	7.8	29.0	6.4	85
04...	1508	40.0	1090	7.5	28.0	4.3	57
04...	1510	50.0	1100	6.9	26.5	.2	3
04...	1512	57.0	1110	6.9	26.0	.2	3

324802099021601 HUBBARD CREEK RESERVOIR SITE P15

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
04...	1530	1.00	1100	7.9	29.0	7.5	100
04...	1532	10.0	1100	7.8	28.0	6.9	91
04...	1534	20.0*	1110	7.7	28.0	6.4	84
04...	1536	30.0	1110	7.7	28.0	6.4	84
04...	1538	35.0	1110	7.7	28.5	6.2	82

324653099032401 HUBBARD CREEK RESERVOIR SITE P16

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
04...	1550	1.00	1090	7.9	29.0	.30	7.2	96	250
04...	1552	10.0	1090	7.7	28.0	--	6.2	82	--
04...	1554	20.0	1100	7.7	27.5	--	6.2	82	--
04...	1555	25.0	1100	7.7	27.5	--	6.0	79	250

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
04...	150	69	19	110	3.2	8.2	98	47	260
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	150	67	19	110	3.3	10	98	47	260

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
04...	3.3	575	.00	1.20	1.2	.030	12	5
04...	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--
04...	3.6	576	.00	.92	.92	.060	18	40

TABLE 21--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, AUGUST 4, 1981--Continued

324608099042101 HUBBARD CREEK RESERVOIR SITE P17

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
04...	1425	1.00	1150	7.8	29.5	6.6	89
04...	1427	10.0	1130	7.4	27.0	5.0	65
04...	1430	20.0	1120	7.4	27.5	5.2	68

324541099053601 HUBBARD CREEK RESERVOIR SITE P18

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
04...	1644	.60	--	--	--	--	--	--	--
04...	1645	1.00	1180	7.5	30.5	.40	6.8	94	270
04...	1647	10.0	1130	6.7	27.5	--	.2	3	--
04...	1650	14.0	1130	6.8	28.0	--	.4	5	260

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
04...	--	--	--	--	--	--	--	--	--
04...	150	76	20	120	3.4	7.9	120	45	280
04...	--	--	--	--	--	--	--	--	--
04...	140	73	20	110	3.1	7.4	120	40	270

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
04...	--	--	--	--	--	--	--	--
04...	5.6	627	.00	1.20	1.2	.030	12	200
04...	--	--	--	--	--	--	--	--
04...	5.2	599	.00	1.50	1.5	.060	750	770

TABLE 22--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, OCTOBER 27, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

324932098575101 HUBBARD CREEK RESERVOIR SITE P1

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARD-.NESS, NONCARBONATE (MG/L CACO3)
OCT										
27...	0940	1.00	632	7.9	17.5	.20	7.4	80	160	87
27...	0941	.40	--	--	--	--	--	--	--	--
27...	0942	10.0	632	7.9	17.5	--	7.5	82	--	--
27...	0944	20.0	634	7.9	17.5	--	7.4	80	--	--
27...	0946	30.0	634	7.9	17.5	--	7.4	80	--	--
27...	0948	40.0	635	7.9	17.5	--	7.4	80	--	--
27...	0950	50.0	639	8.0	17.0	--	7.5	81	--	--
27...	0952	60.0	645	7.9	17.0	--	7.5	81	--	--
27...	0954	70.0	645	7.9	17.0	--	7.4	80	160	84

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
OCT									
27...	45	11	57	2.1	6.1	71	18	160	.3
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	45	11	59	2.2	5.9	74	26	150	--

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)	ARSENIC DISSOLVED (UG/L AS AS)
OCT									
27...	4.9	345	.22	.43	.65	.040	75	9	1
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	.11	.61	.72	.050	20	10	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	5.0	347	.20	.93	1.1	.040	62	30	1

DATE	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	LEAD, DISSOLVED (UG/L AS PB)	MERCURY DISSOLVED (UG/L AS HG)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)
OCT									
27...	160	<1	<10	2	1	<.1	<1	<1	11
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	150	<1	<10	3	1	<.1	<1	<1	9

TABLE 22--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, OCTOBER 27, 1981--continued

324712098575701 HUBBARD CREEK RESERVOIR SITE P4

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
27...	1040	1.00	642	8.0	16.5	7.9	84
27...	1042	10.0	642	8.0	16.5	7.9	84
27...	1044	21.0	702	7.7	15.0	7.0	72

324843098582901 HUBBARD CREEK RESERVOIR SITE P6

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
27...	1350	1.00	581	7.9	18.0	7.5	82
27...	1352	10.0	576	8.0	17.5	7.5	82
27...	1354	20.0	576	8.0	17.5	7.5	82
27...	1356	[illegible]	[illegible]	[illegible]	17.0	7.5	81
27...	1358	40.0	487	7.9	17.0	7.5	81
27...	1400	50.0	483	7.9	16.5	7.5	80
27...	1402	60.0	480	7.9	16.5	7.6	81
27...	1404	69.0	480	7.8	17.0	7.8	84

324649099000501 HUBBARD CREEK RESERVOIR SITE P9

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
27...	1420	1.00	412	7.8	16.5	.20	7.8	83	110
27...	1422	10.0	408	7.8	16.0	--	7.7	81	--
27...	1424	20.0	463	7.8	16.0	--	7.7	81	--
27...	1426	30.0	459	7.8	16.0	--	7.6	80	--
27...	1428	40.0	416	7.8	16.0	--	7.6	80	--
27...	1430	50.0	284	7.7	16.0	--	7.2	76	86

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
27...	52	34	6.7	35	1.5	4.4	61	7.0	95
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	32	27	4.6	21	1.0	3.7	54	9.0	52

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
27...	5.7	225	.30	.75	1.1	.060	170	12
27...	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--
27...	--	--	.18	.55	.73	.080	440	30
27...	7.1	157	.34	.83	1.2	.100	510	48

TABLE 22--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, OCTOBER 27, 1981--continued

324606099000201 HUBBARD CREEK RESERVOIR SITE P10

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
27...	0910	1.00	285	7.6	15.0	7.8	80
27...	0912	10.0	285	7.6	15.0	7.8	80
27...	0914	20.0	285	7.6	15.0	7.8	80
27...	0916	30.0	277	7.6	15.0	7.7	79
27...	0918	36.0	262	7.5	15.0	7.4	76

324514099010201 HUBBARD CREEK RESERVOIR SITE P11

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
27...	1500	1.00	237	7.7	16.5	7.7	82
27...	1502	10.0	233	7.7	16.0	7.7	81
27...	1504	20.0	233	7.7	15.5	7.6	79
27...	1506	30.0	233	7.6	15.5	7.4	77

324301099001701 HUBBARD CREEK RESERVOIR SITE P12

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
27...	1515	1.00	494	7.9	15.0	.20	8.1	84	150
27...	1517	10.0	515	7.9	15.0	--	8.1	84	--
27...	1519	18.0	621	7.6	14.5	--	6.6	67	160

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
27...	62	49	5.8	37	1.4	4.1	84	7.0	100
27...	--	--	--	--	--	--	--	--	--
27...	77	54	7.0	49	1.7	4.2	87	8.0	140

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
27...	9.0	262	.37	.95	1.3	.070	48	16
27...	--	--	--	--	--	--	--	--
27...	10	325	.49	.81	1.3	.060	290	55

TABLE 22--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, OCTOBER 27, 1981--continued

324949098594301 HUBBARD CREEK RESERVOIR SITE P13

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
27...	1055	1.00	615	8.0	18.0	7.5	82
27...	1057	10.0	613	8.0	17.5	7.5	82
27...	1059	20.0	597	8.0	17.5	7.6	83
27...	1101	30.0	591	8.0	17.0	7.6	82
27...	1103	40.0	587	8.0	17.0	7.6	82
27...	1105	50.0	589	8.0	17.0	7.6	82
27...	1107	60.0	596	8.0	17.0	7.5	81
27...	1109	65.0	591	7.9	17.0	7.4	80

324802099021601 HUBBARD CREEK RESERVOIR SITE P15

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
27...	1130	1.00	564	8.0	16.5	7.9	84
27...	1132	10.0	556	8.0	16.5	7.9	84
27...	1134	20.0	471	8.0	15.5	7.8	81
27...	1136	30.0	446	8.0	15.5	7.8	81
27...	1138	40.0	446	7.9	16.0	7.6	80

324653099032401 HUBBARD CREEK RESERVOIR SITE P16

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
27...	1150	1.00	429	7.9	15.0	.20	7.8	80	120
27...	1152	10.0	429	7.9	15.0	--	7.7	79	--
27...	1154	20.0	475	7.8	15.0	--	7.2	74	--
27...	1156	29.0	777	7.6	15.0	--	4.9	51	220

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
27...	45	38	7.0	34	1.4	4.9	79	6.0	88
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	100	68	13	66	2.0	5.2	120	35	150

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
27...	7.7	233	.22	.88	1.1	.090	130	15
27...	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--
27...	13	423	.46	.90	1.4	.090	390	140

TABLE 22--CHEMICAL-QUALITY SURVEY OF HUBBARD CREEK RESERVOIR, OCTOBER 27, 1981--continued

324608099042101 HUBBARD CREEK RESERVOIR SITE P17

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
27...	1223	1.00	976	7.6	16.0	5.1	54
27...	1225	10.0	1240	7.6	15.5	5.0	52
27...	1227	25.0	1360	7.6	15.5	5.4	56

324541099053601 HUBBARD CREEK RESERVOIR SITE P18

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
27...	1300	1.00	1140	7.8	16.0	.30	6.3	66	310
27...	1301	.40	--	--	--	--	--	--	--
27...	1302	10.0	1750	7.9	15.0	--	7.5	77	--
27...	1304	19.0	1880	7.8	15.5	--	7.0	73	470

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
27...	170	91	20	99	2.6	5.1	140	72	240
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	310	131	35	190	4.1	5.0	160	120	430

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
27...	12	623	.79	1.00	1.8	.050	<10	160
27...	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--
27...	12	1020	1.4	1.00	2.4	.030	12	190

TABLE 23--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, AUGUST 5-6, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

325208098254201 POSSUM KINGDOM LAKE SITE AR

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
05...	1650	1.00	2650	7.9	30.0	6.5	88
05...	1652	10.0	2650	7.9	29.5	6.5	88
05...	1654	20.0	2650	7.8	28.5	5.6	74
05...	1656	30.0	2640	7.2	27.5	2.2	28
05...	1658	40.0	2610	7.1	26.0	.1	1
05...	1700	50.0	2640	7.0	23.0	.1	1

325218098254101 POSSUM KINGDOM LAKE SITE AC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
AUG										
05...	1615	1.00	2670	7.9	30.0	2.10	6.5	88	480	380
05...	1616	3.50	--	--	--	--	--	--	--	--
05...	1617	10.0	2670	7.9	29.5	--	6.4	86	--	--
05...	1619	20.0	2660	7.7	28.5	--	5.1	67	--	--
05...	1621	30.0	2660	7.3	27.5	--	2.2	28	--	--
05...	1623	40.0	2620	7.0	25.5	--	.1	1	--	--
05...	1625	50.0	2680	7.0	23.0	--	.1	1	--	--
05...	1627	60.0	2770	7.0	21.0	--	.1	1	--	--
05...	1629	70.0	2910	7.0	20.0	--	.1	1	--	--
05...	1631	80.0	3100	7.0	18.5	--	.1	1	--	--
05...	1633	90.0	3160	6.9	17.5	--	.1	1	--	--
05...	1635	102	3170	6.9	16.5	--	.1	1	590	440

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
AUG									
05...	130	37	3[illegible]	7.4	7.4	95	370	600	.3
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	160	45	450	8.1	7.7	150	400	740	--

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)	ARSENIC DISSOLVED (UG/L AS AS)
AUG									
05...	3.7	1580	<.10	.87	--	.020	20	10	1
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	.00	.76	.76	.020	20	20	--
05...	--	--	.00	.72	.72	.020	20	30	--
05...	--	--	.00	.61	.61	.020	40	120	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	11	1910	.00	2.10	2.1	.300	120	770	4

TABLE 23--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, AUGUST 5-6, 1981

325218098254101 POSSUM KINGDOM LAKE SITE AC--CONTINUED

DATE	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	LEAD, DIS-SOLVED (UG/L AS PB)	MERCURY DIS-SOLVED (UG/L AS HG)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, DIS-SOLVED (UG/L AS ZN)
AUG									
05...	100	0	0	50	0	.0	1	0	10
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	200	0	0	50	0	1	0	0	10

325250098275301 POSSUM KINGDOM LAKE SITE BR

DATE	TIME	SAM-PLING DEPTH (FEET)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
AUG							
05...	1550	1.00	2680	8.0	31.0	7.1	97
05...	1552	10.0	2680	8.0	30.0	6.6	89
05...	1554	20.0	2680	7.7	29.0	4.9	65
05...	1556	30.0	2680	7.2	28.0	1.4	18
05...	1559	44.0	2710	7.1	26.0	.2	3

325256098275301 POSSUM KINGDOM LAKE SITE BC

DATE	TIME	SAM-PLING DEPTH (FEET)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
AUG							
05...	1520	1.00	2690	8.0	30.5	6.7	91
05...	1522	10.0	2690	8.0	29.0	6.5	87
05...	1524	20.0	2690	7.9	29.0	6.2	83
05...	1526	30.0	2690	7.3	28.0	2.7	35
05...	1528	40.0	2730	7.0	25.5	.1	1
05...	1530	50.0	2780	7.0	24.0	.1	1
05...	1532	60.0	2830	7.0	22.0	.1	1
05...	1534	70.0	3030	7.0	21.0	.1	1
05...	1536	80.0	3200	7.0	19.0	.2	2
05...	1539	94.0	3210	7.0	17.5	.2	2

325129098311801 POSSUM KINGDOM LAKE SITE CC

DATE	TIME	SAM-PLING DEPTH (FEET)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
AUG							
05...	1400	1.00	2660	8.0	30.0	6.4	86
05...	1402	10.0	2660	8.0	29.0	6.4	85
05...	1404	20.0	2670	8.0	29.0	6.4	85
05...	1406	30.0	2670	7.5	28.5	4.0	52
05...	1408	40.0	2720	7.0	26.5	.1	1
05...	1410	50.0	2880	7.0	24.0	.2	2
05...	1412	60.0	3050	7.0	22.5	.2	2
05...	1414	70.0	3180	7.0	21.0	.2	2
05...	1416	75.0	3180	7.0	21.5	.3	4

TABLE 23--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, AUGUST 5-6, 1981

325327098314001 POSSUM KINGDOM LAKE SITE DC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
05...	1230	1.00	2670	8.0	30.0	1.50	6.6	89	510
05...	1232	10.0	2670	8.0	30.0	--	6.4	86	--
05...	1234	20.0	2630	7.5	29.0	--	3.3	44	--
05...	1236	30.0	2640	7.3	28.5	--	2.6	34	--
05...	1238	40.0	2740	7.0	26.5	--	.1	1	--
05...	1240	50.0	2950	7.0	24.5	--	.1	1	--
05...	1242	60.0	3160	7.0	23.0	--	.3	4	--
05...	1245	70.0	3280	6.9	23.0	--	.3	4	610

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
05...	420	140	38	360	7.0	7.2	90	360	590
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	460	170	46	450	7.9	7.2	150	400	740

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
05...	5.5	1550	.00	.79	.79	.020	10	10
05...	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--
05...	--	--	.00	.85	.85	.030	30	50
05...	--	--	.01	.93	.94	.040	100	470
05...	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--
05...	10	1910	.00	2.30	2.3	.280	100	530

325347098265701 POSSUM KINGDOM LAKE SITE EC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
05...	1800	1.00	2620	8.1	30.0	7.1	96
05...	1802	10.0	2600	8.0	29.0	6.0	80
05...	1804	20.0	2610	7.8	28.5	5.0	66
05...	1806	30.0	2640	7.4	28.5	2.3	30
05...	1808	40.0	2680	7.2	28.0	1.2	16
05...	1810	53.0	3050	7.0	25.0	.2	2

TABLE 23--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, AUGUST 5-6, 1981

325557098264401 POSSUM KINGDOM LAKE SITE FC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	0945	1.00	2580	8.1	29.5	6.8	92
06...	0947	10.0	2590	8.1	29.5	6.4	86
06...	0949	20.0	2600	7.8	29.0	4.5	60
06...	0951	30.0	2600	7.7	28.5	4.0	53
06...	0954	42.0	2630	7.3	28.5	2.2	29

325715098250501 POSSUM KINGDOM LAKE SITE GC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
06...	1005	1.00	2590	8.1	30.0	.80	6.9	93	510
06...	1007	10.0	2570	7.9	29.5	--	5.3	72	--
06...	1009	20.0	2640	7.6	29.0	--	3.4	45	--
06...	1012	32.0	2960	7.3	29.0	--	1.3	17	600

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
06...	420	140	39	350	6.7	8.3	90	400	580
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	510	160	48	390	6.9	8.6	89	480	610

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
06...	7.9	1580	.00	.95	.95	.040	30	10
06...	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--
06...	9.4	1760	.00	1.10	1.1	.090	20	170

325047098291201 POSSUM KINGDOM LAKE SITE P3

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
05...	1445	1.00	2680	7.9	29.5	6.4	86
05...	1447	10.0	2680	7.9	28.5	6.0	79
05...	1449	20.0	2680	7.8	28.5	5.5	72
05...	1451	30.0	2680	7.6	28.5	4.5	59
05...	1453	40.0	2730	7.0	26.0	.1	1
05...	1455	50.0	2780	7.0	24.0	.2	2
05...	1457	60.0	2830	7.0	23.0	.2	2

TABLE 23--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, AUGUST 5-6, 1981

325125098323701 POSSUM KINGDOM LAKE SITE P5

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
05...	1345	1.00	2680	8.0	29.5	6.4	86
05...	1347	10.0	2680	8.0	29.0	6.6	88
05...	1349	20.0	2680	7.9	29.0	6.0	80
05...	1351	27.0	2680	7.9	29.0	5.5	73

325301098342901 POSSUM KINGDOM LAKE SITE P7

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
05...	1310	1.00	2680	8.0	30.5	6.5	87
05...	1312	10.0	2670	7.9	29.5	5.9	80
05...	1314	20.0	2680	7.8	29.0	4.8	64
05...	1316	30.0	2690	7.6	29.0	3.6	48
05...	1318	40.0	2700	7.0	26.0	.1	1
05...	1320	50.0	2720	7.0	24.5	.1	1
05...	1322	56.0	2760	7.0	23.0	.3	4

325915098243001 POSSUM KINGDOM LAKE SITE P9

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1030	1.00	2440	8.2	30.5	7.4	100
06...	1032	10.0	2490	8.0	30.0	6.3	85
06...	1034	20.0	2490	7.9	29.5	4.5	61
06...	1035	26.0	2510	7.5	29.5	2.5	34

TABLE 23--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, AUGUST 5-6, 1981--continued

325725098280301 POSSUM KINGDOM LAKE SITE P10

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
06...	1050	1.00	2820	8.1	29.5	.40	7.7	104	560
06...	1051	.60	--	--	--	--	--	--	--
06...	1055	6.00	2900	7.8	29.5	--	6.0	81	570

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
06...	490	150	46	380	7.0	9.1	75	480	600
06...	--	--	--	--	--	--	--	--	--
06...	500	150	48	380	6.9	9.1	77	470	620

DATE	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG									
06...	--	8.5	1720	.00	1.50	1.5	.060	20	10
06...	--	--	--	--	--	--	--	--	--
06...	.3	8.6	1730	.00	1.30	1.3	.090	30	20

TABLE 24--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, OCTOBER 28, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

325218098254101 POSSUM KINGDOM LAKE SITE AC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
OCT										
28...	1155	1.00	1300	7.5	20.0	.50	5.4	61	250	170
28...	1156	.90	--	--	--	--	--	--	--	--
28...	1157	10.0	1300	7.5	20.0	--	5.4	61	--	--
28...	1159	20.0	1300	7.5	20.0	--	5.4	61	--	--
28...	1201	30.0	1300	7.5	20.0	--	5.4	61	--	--
28...	1203	40.0	1300	7.5	20.0	--	5.3	60	--	--
28...	1205	50.0	1300	7.5	20.0	--	5.3	60	--	--
28...	1207	60.0	1300	7.5	20.0	--	5.3	60	--	--
28...	1209	70.0	1300	7.5	20.0	--	5.3	60	--	--
28...	1211	80.0	1310	7.5	20.0	--	5.1	58	--	--
28...	1213	90.0	1420	7.4	20.0	--	4.6	52	--	--
28...	1215	100	1900	7.3	20.0	--	2.6	30	--	--
28...	1217	107	1940	7.2	20.0	--	2.3	26	360	280

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
OCT									
28...	70	17	170	5.0	5.6	74	150	280	.3
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	98	27	270	6.2	6.7	80	250	420	--

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)	ARSENIC DISSOLVED (UG/L AS AS)
OCT									
28...	5.6	743	.37	.56	.93	.050	65	10	1
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	.27	.58	.85	.050	20	20	--
28...	--	--	.31	.60	.91	.060	70	70	--
28...	6.1	1130	.41	.75	1.2	.120	30	100	2

DATE	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	LEAD, DISSOLVED (UG/L AS PB)	MERCURY DISSOLVED (UG/L AS HG)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)
OCT									
28...	120	<1	<10	2	2	<.1	<1	<1	5
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	200	<1	<10	2	<1	<.1	<1	<1	10

TABLE 24--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, OCTOBER 28, 1981--continued

325208098254201 POSSUM KINGDOM LAKE SITE AR

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1243	1.00	1300	7.5	20.0	5.6	64
28...	1245	10.0	1300	7.5	20.0	5.5	63
28...	1247	20.0	1300	7.5	20.0	5.4	61
28...	1249	30.0	1300	7.5	20.0	5.3	60
28...	1251	40.0	1300	7.5	20.0	5.2	59
28...	1253	50.0	1300	7.5	20.0	5.2	59
28...	1255	65.0	1310	7.5	20.0	5.1	58

325250098275301 POSSUM KINGDOM LAKE SITE BR

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1050	1.00	1220	7.6	19.5	5.8	65
28...	1052	10.0	1230	7.6	19.5	5.8	65
28...	1054	20.0	1230	7.6	19.5	5.8	65
28...	1056	30.0	1230	7.5	19.5	5.6	63
28...	1058	40.0	1210	7.6	19.5	5.7	64
28...	1100	50.0	1230	7.5	19.5	5.6	63
28...	1102	64.0	1240	7.5	19.5	5.3	60

325256098275301 POSSUM KINGDOM LAKE SITE BC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1105	1.00	1250	7.5	20.0	5.9	67
28...	1107	10.0	1250	7.6	20.0	5.8	66
28...	1109	20.0	1250	7.6	20.0	5.8	66
28...	1111	30.0	1250	7.6	20.0	5.8	66
28...	1113	40.0	1250	7.6	20.0	5.8	66
28...	1115	50.0	1250	7.5	20.0	5.6	64
28...	1117	60.0	1260	7.5	19.5	5.5	62
28...	1119	70.0	1270	7.5	19.5	5.3	60
28...	1121	80.0	1330	7.5	20.0	5.0	57
28...	1123	90.0	2120	7.3	20.5	3.1	36
28...	1125	99.0	2340	7.2	20.5	1.5	17

TABLE 24--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, OCTOBER 28, 1981--continued

325129098311801 POSSUM KINGDOM LAKE SITE CC

DATE	TIME	SAMPLING DEPTH (FEET)	CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	(PERCENT SATURATION)
OCT							
28...	1010	1.00	1030	7.5	19.0	6.0	67
28...	1012	10.0	1030	7.5	19.0	6.1	68
28...	1014	20.0	1030	7.5	19.0	6.0	67
28...	1016	30.0	1040	7.5	18.5	6.0	66
28...	1018	40.0	1040	7.5	19.0	5.9	66
28...	1020	50.0	1050	7.6	18.5	6.0	66
28...	1022	60.0	1050	7.6	18.5	5.9	65
28...	1024	70.0	990	7.5	18.5	5.7	63
28...	1026	82.0	1170	7.4	18.0	5.1	55

325327098314001 POSSUM KINGDOM LAKE SITE DC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
28...	0930	1.00	965	7.6	19.0	.30	6.2	69	200
28...	0932	10.0	961	7.6	19.0	--	6.3	70	--
28...	0934	20.0	951	7.6	18.5	--	6.3	69	--
28...	0936	30.0	947	7.6	19.0	--	6.3	70	--
28...	0938	40.0	918	7.6	18.5	--	6.4	70	--
28...	0940	50.0	815	7.6	17.5	--	6.9	74	--
28...	0942	60.0	815	7.6	17.5	--	7.1	76	--
28...	0944	74.0	817	7.6	17.0	--	7.1	76	190

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
28...	120	58	14	120	3.9	5.9	79	110	210
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	110	55	13	90	3.0	6.6	85	73	170

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
28...	6.7	572	.36	.60	.96	.080	130	11
28...	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--
28...	--	--	.23	.67	.90	.050	20	<10
28...	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--
28...	6.9	466	.28	.59	.87	.070	140	10

TABLE 24--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, OCTOBER 28, 1981--continued

325347098265701 POSSUM KINGDOM LAKE SITE EC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1430	1.00	830	7.8	17.5	7.3	79
28...	1432	10.0	830	7.8	17.5	7.3	79
28...	1434	20.0	830	7.8	17.0	7.3	78
28...	1436	30.0	950	7.7	16.5	7.3	78
28...	1438	40.0	1150	7.8	16.0	7.4	78
28...	1440	50.0	1350	7.8	16.0	7.4	78
28...	1442	58.0	1380	7.6	16.0	7.2	76

325557098264401 POSSUM KINGDOM LAKE SITE FC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1455	1.00	870	7.9	17.0	7.5	81
28...	1457	10.0	870	7.9	17.0	7.5	81
28...	1459	20.0	880	7.9	16.5	7.5	80
28...	1501	30.0	1790	7.9	15.0	7.7	79
28...	1503	43.0	1810	7.9	15.0	7.7	79

325715098250501 POSSUM KINGDOM LAKE SITE GC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT								
28...	1515	1.00	982	8.0	16.5	7.7	82	200
28...	1517	10.0	982	8.0	16.5	7.7	82	--
28...	1519	20.0	1380	7.9	15.5	7.6	79	--
28...	1521	33.0	1880	7.9	15.5	7.6	79	330

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
28...	110	58	13	120	3.9	6.0	90	84	210
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	220	94	22	260	6.6	6.6	110	160	470

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
28...	6.4	552	.27	.60	.87	.050	<10	2
28...	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--
28...	7.2	1090	.31	.59	.90	.070	68	8

TABLE 24--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, OCTOBER 28, 1981--continued

325047098291201 POSSUM KINGDOM LAKE SITE P3

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT						
28...	1320	1.00	1150	20.0	6.0	68
28...	1322	10.0	1150	19.5	5.7	64
28...	1324	20.0	1150	19.0	5.5	61
28...	1326	30.0	1150	19.0	5.6	62
28...	1328	40.0	1150	19.0	5.6	62
28...	1330	50.0	1150	19.0	5.6	62
28...	1332	65.0	1150	19.0	5.3	59

325125098323701 POSSUM KINGDOM LAKE SITE P5

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1730	1.00	990	7.7	18.5	6.3	70
28...	1732	10.0	990	7.7	18.5	6.2	69
28...	1734	20.0	984	7.7	18.5	6.1	68
28...	1736	32.0	855	7.6	17.5	5.9	64

325301098342901 POSSUM KINGDOM LAKE SITE P7

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1703	1.00	644	7.7	18.5	6.2	69
28...	1705	10.0	673	7.7	18.5	6.1	68
28...	1707	20.0	782	7.7	18.5	6.0	67
28...	1709	30.0	774	7.6	18.0	5.9	65
28...	1711	40.0	812	7.7	18.0	6.0	66
28...	1713	50.0	506	7.7	17.0	5.9	63
28...	1715	66.0	506	7.7	17.0	5.8	62

325915098243001 POSSUM KINGDOM LAKE SITE P9

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
28...	1542	1.00	893	7.9	16.5	7.5	80
28...	1544	10.0	913	7.9	16.5	7.5	80
28...	1546	20.0	913	7.9	16.0	7.4	78
28...	1548	32.0	1680	7.9	15.5	7.3	76

TABLE 24--CHEMICAL-QUALITY SURVEY OF POSSUM KINGDOM LAKE, OCTOBER 28, 1981--continued

325725098280301 POSSUM KINGDOM LAKE SITE P10

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
28...	1605	1.00	1870	8.2	17.0	.20	8.5	91	300
28...	1606	.30	--	--	--	--	--	--	--
28...	1607	11.0	2030	8.0	16.0	--	7.8	82	350

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
28...	200	86	20	230	6.2	6.8	100	140	400
28...	--	--	--	--	--	--	--	--	--
28...	250	99	24	290	6.8	6.9	100	170	490

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
28...	6.8	950	.29	.61	.90	.050	<10	3
28...	--	--	--	--	--	--	--	--
28...	7.2	1150	.29	.72	1.0	.060	40	10

TABLE 25--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, AUGUST 6-7, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

322227097412101 LAKE GRANBURY SITE AC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
AUG										
06...	1730	1.00	2430	7.9	30.5	1.10	7.0	95	440	340
06...	1731	1.70	--	--	--	--	--	--	--	--
06...	1732	10.0	2420	7.8	29.5	--	6.2	82	--	--
06...	1734	20.0	2420	7.7	29.0	--	5.1	67	--	--
06...	1736	30.0	2410	7.6	29.0	--	4.8	63	--	--
06...	1738	40.0	2430	7.0	27.5	--	.1	1	--	--
06...	1740	50.0	2410	6.9	25.0	--	.1	1	--	--
06...	1742	60.0	2380	6.9	22.5	--	.1	1	--	--
06...	1745	68.0	2420	6.9	21.5	--	.1	1	460	260

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
AUG									
06...	120	34	340	7.1	7.3	99	300	540	.3
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	130	33	330	6.7	7.4	200	250	540	--

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)	ARSENIC DISSOLVED (UG/L AS AS)
AUG									
06...	5.0	1410	.01	.67	.68	.030	10	20	1
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	.01	.79	.80	.030	20	50	--
06...	--	--	.01	.64	.65	.040	120	870	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	14	1430	.01	3.20	3.2	.500	80	2800	8

DATE	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	LEAD, DISSOLVED (UG/L AS PB)	MERCURY DISSOLVED (UG/L AS HG)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)
AUG									
06...	100	0	0	50	0	.0	0	0	10
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	200	0	10	50	0	.0	0	0	10

322231097412001 LAKE GRANBURY SITE AL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1800	1.00	2430	7.9	31.0	7.0	95
06...	1802	10.0	2420	7.8	29.5	6.4	84
06...	1805	24.0	2420	7.7	29.5	5.5	72

TABLE 25--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, AUGUST 6-7, 1981

322345097421901 LAKE GRANBURY SITE BR

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1645	1.00	2450	8.0	31.5	7.5	101
06...	1647	10.0	2460	8.1	30.5	7.0	93
06...	1649	22.0	2480	7.3	30.5	2.7	36

322341097420601 LAKE GRANBURY SITE BC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1655	1.00	2440	8.0	31.0	7.5	101
06...	1657	10.0	2450	8.0	30.0	6.8	91
06...	1659	20.0	2470	7.3	29.5	2.6	34
06...	1701	30.0	2430	7.1	29.0	1.0	13
06...	1703	40.0	2470	7.0	28.0	.1	1
06...	1705	50.0	2440	6.9	26.0	.1	1
06...	1707	60.0	2440	6.9	24.0	.2	2
06...	1708	65.0	2440	6.9	23.0	.2	2

322337097415401 LAKE GRANBURY SITE BL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1710	1.00	2440	8.1	31.5	7.9	107
06...	1712	10.0	2440	8.0	30.0	6.6	88
06...	1714	20.0	2470	7.1	29.5	2.7	36
06...	1716	29.0	2410	7.3	29.5	1.1	14

322537097414501 LAKE GRANBURY SITE CC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1630	1.00	2480	8.1	33.0	7.9	111
06...	1632	6.00	2470	8.1	32.0	8.3	115

TABLE 25--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, AUGUST 6-7, 1981

322422097423901 LAKE GRANBURY SITE DC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1555	1.00	2500	7.9	32.5	7.0	97
06...	1557	10.0	2470	8.1	30.5	7.3	99
06...	1559	20.0	2480	7.7	30.0	4.6	62
06...	1601	30.0	2660	7.0	29.5	.1	1
06...	1603	40.0	2560	7.0	28.0	.1	1
06...	1605	50.0	2490	6.9	26.0	.1	1
06...	1607	58.0	2480	6.9	25.5	.1	1

322437097423901 LAKE GRANBURY SITE DL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1615	1.00	2500	7.8	32.5	6.5	90
06...	1617	10.0	2470	8.1	30.5	7.2	97
06...	1620	20.0	2480	7.5	30.5	4.0	54

322458097443101 LAKE GRANBURY SITE EC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
06...	1525	1.00	2480	8.4	33.0	11.2	158
06...	1527	10.0	2490	8.0	31.0	7.0	95
06...	1529	20.0	2540	7.6	29.5	4.0	53
06...	1531	30.0	2670	7.2	29.5	1.4	19
06...	1533	40.0	2720	7.1	29.0	.2	3
06...	1535	53.0	2490	6.9	25.5	.2	2

TABLE 25--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, AUGUST 6-7, 1981

322619097463301 LAKE GRANBURY SITE FC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
06...	1850	1.00	2490	8.2	31.5	1.00	9.4	127	440
06...	1852	10.0	2500	8.1	30.5	--	8.3	112	--
06...	1854	20.0	2570	7.7	29.5	--	5.1	68	--
06...	1856	30.0	2830	7.3	29.0	--	2.7	36	--
06...	1859	43.0	2860	7.3	29.5	--	2.1	28	510

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
06...	350	120	34	340	7.1	7.0	85	300	560
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	410	140	39	390	7.5	7.4	100	360	640

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
06...	6.2	1420	.01	.74	.75	.040	30	10
06...	--	--	--	--	--	--	--	--
06...	--	--	.01	.72	.73	.050	20	10
06...	--	--	.01	.95	.96	.060	20	40
06...	7.0	1640	.01	1.10	1.1	.060	20	80

322703097451401 LAKE GRANBURY SITE GC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
07...	0905	1.00	2510	8.0	29.5	7.5	99
07...	0907	10.0	2520	7.9	29.0	6.1	79
07...	0910	22.0	2810	7.1	28.5	1.3	17

322834097470801 LAKE GRANBURY SITE HC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)
AUG							
07...	0925	1.00	2650	8.0	29.5	.50	7.1
07...	0927	10.0	2660	7.9	29.5	--	6.9
07...	0929	20.0	2730	7.8	29.0	--	5.9
07...	0932	31.0	2890	7.5	28.5	--	3.5

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG							
07...	93	.01	6.30	6.3	.050	20	10
07...	91	--	--	--	--	--	--
07...	77	.01	.93	.94	.060	20	20
07...	45	.01	.95	.96	.080	20	110

TABLE 25--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, AUGUST 6-7, 1981--continued

322819097483201 LAKE GRANBURY SITE 1C

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
07...	0945	1.00	2780	7.9	28.5	7.1	91
07...	0947	10.0	2770	7.9	28.5	6.7	86
07...	0950	19.0	2780	7.9	28.5	6.5	83

323318097480101 LAKE GRANBURY SITE 3C

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
07...	1005	1.00	2960	7.9	30.5	6.8	91
07...	1007	10.0	2960	7.7	30.0	5.7	76
07...	1010	21.0	2980	7.1	28.5	.5	6

323435097492001 LAKE GRANBURY SITE 4C

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
AUG									
07...	1020	1.00	2970	7.9	31.0	.60	7.3	97	540
07...	1021	1.10	--	--	--	--	--	--	--
07...	1025	14.0	2980	7.3	29.5	--	2.5	33	540

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
AUG									
07...	440	150	41	410	7.7	6.7	100	380	680
07...	--	--	--	--	--	--	--	--	--
07...	430	150	41	420	7.8	6.8	110	380	700

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG								
07...	4.9	1730	.01	.69	.70	.040	30	20
07...	--	--	--	--	--	--	--	--
07...	6.1	1770	.01	.84	.85	.070	30	400

TABLE 26--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, OCTOBER 29, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

322227097412101 LAKE GRANBURY SITE AC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS, (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
OCT										
29...	1130	1.00	1510	7.6	18.5	.30	7.1	77	290	210
29...	1131	.50	--	--	--	--	--	--	--	--
29...	1132	10.0	1510	7.6	18.5	--	7.2	78	--	--
29...	1134	20.0	1510	7.6	18.0	--	7.3	78	--	--
29...	1136	30.0	1510	7.6	18.0	--	7.3	78	--	--
29...	1138	40.0	1520	7.6	18.0	--	7.2	77	--	--
29...	1140	50.0	1520	7.6	18.0	--	7.3	78	--	--
29...	1142	60.0	1520	7.6	18.0	--	7.1	76	--	--
29...	1144	68.0	1520	7.7	18.0	--	7.1	76	290	210

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
OCT									
29...	81	21	200	5.5	5.7	75	190	330	.3
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	81	21	200	5.5	5.7	77	190	330	--

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)	ARSENIC DISSOLVED (UG/L AS AS)
OCT									
29...	5.4	879	.27	.76	1.0	.040	<10	1	1
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	.16	.72	.88	.050	40	<10	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	5.4	880	.27	.91	1.2	.040	11	4	1

DATE	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	LEAD, DISSOLVED (UG/L AS PB)	MERCURY DISSOLVED (UG/L AS HG)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)
OCT									
29...	120	<1	<10	2	0	<.1	<1	<1	5
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	120	<1	10	8	4	<.1	<1	<1	7

TABLE 26--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, OCTOBER 29, 1981--continued

322231097412001 LAKE GRANBURY SITE AL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1220	1.00	1510	7.6	18.0	7.0	75
29...	1222	10.0	1510	7.6	18.5	7.0	76
29...	1224	20.0	1510	7.6	18.5	7.0	76
29...	1226	30.0	1510	7.6	18.5	7.0	76
29...	1228	38.0	1510	7.6	18.5	6.9	75

322345097421901 LAKE GRANBURY SITE BR

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1105	1.00	1510	7.7	18.5	8.2	89
29...	1107	10.0	1500	7.7	18.5	8.2	89

322341097420601 LAKE GRANBURY SITE BC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1047	1.00	1500	7.7	18.5	8.3	90
29...	1049	10.0	1500	7.7	18.5	8.4	91
29...	1051	20.0	1500	7.7	18.0	8.4	90
29...	1053	30.0	1470	7.7	18.0	7.8	84
29...	1055	40.0	1460	7.7	18.0	8.4	90
29...	1057	50.0	1440	7.7	17.5	8.6	91
29...	1059	60.0	1390	7.7	17.5	8.3	88
29...	1101	65.0	1400	7.7	17.5	8.8	94

322337097415401 LAKE GRANBURY SITE BL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1114	1.00	1490	7.7	18.5	8.0	87
29...	1116	10.0	1490	7.7	18.0	7.9	85
29...	1118	23.0	1490	7.7	18.0	7.9	85

TABLE 26--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, OCTOBER 29, 1981--continued

322537097414501 LAKE GRANBURY SITE CC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1027	1.00	1360	8.0	18.0	8.8	95
29...	1029	9.00	1360	7.9	18.0	8.6	92

322422097423901 LAKE GRANBURY SITE DC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	0950	1.00	1290	7.7	17.5	8.2	87
29...	0952	10.0	1270	7.7	17.0	8.3	87
29...	0954	20.0	1270	7.6	17.0	8.3	87
29...	0956	30.0	1230	7.6	17.0	8.5	89
29...	0958	40.0	1200	7.6	17.0	8.8	93
29...	1000	50.0	1180	7.6	16.5	8.8	92
29...	1002	59.0	1170	7.6	16.5	8.9	93

322437097423901 LAKE GRANBURY SITE DL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1010	1.00	1290	7.7	17.5	8.5	90
29...	1012	13.0	1330	7.7	17.5	8.5	90

322458097443101 LAKE GRANBURY SITE EC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	0925	1.00	1140	7.7	17.0	8.6	91
29...	0927	10.0	1140	7.7	16.5	8.6	90
29...	0929	20.0	1140	7.6	16.5	8.5	89
29...	0931	30.0	1120	7.6	16.5	8.5	89
29...	0933	40.0	1080	7.6	16.0	8.6	89
29...	0935	50.0	1080	7.6	16.0	8.4	87
29...	0937	57.0	1080	7.6	16.0	8.4	87

TABLE 26--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, OCTOBER 29, 1981--continued

322619097463301 LAKE GRANBURY SITE FC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
29...	1252	1.00	1090	7.7	17.0	.30	7.4	78	230
29...	1254	10.0	1090	7.7	16.5	--	7.2	75	--
29...	1256	20.0	1130	7.6	16.0	--	7.3	75	--
29...	1258	30.0	1130	7.7	16.0	--	7.3	75	--
29...	1300	44.0	1130	7.8	17.0	--	7.2	76	240

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
29...	130	68	15	130	3.9	4.7	98	110	230
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	140	71	16	130	3.8	5.0	100	120	230

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
29...	7.4	624	.39	.86	1.3	.050	14	2
29...	--	--	--	--	--	--	--	--
29...	--	--	.40	.59	.99	.060	50	<10
29...	--	--	--	--	--	--	--	--
29...	7.7	640	.39	.71	1.1	.030	<10	1

322703097451401 LAKE GRANBURY SITE GC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1426	1.00	1170	7.8	17.5	7.7	82
29...	1428	10.0	1150	7.8	17.0	7.3	77
29...	1430	23.0	1250	7.7	17.0	6.6	69

TABLE 26--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, OCTOBER 29, 1981--continued

322834097470801 LAKE GRANBURY SITE HC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)
OCT							
29...	1400	1.00	1400	7.6	17.5	.20	7.6
29...	1402	10.0	1400	7.6	17.0	--	7.6
29...	1404	20.0	1380	7.6	17.0	--	7.5
29...	1406	34.0	1380	7.8	17.0	--	7.3

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT							
29...	80	.30	.63	.93	.070	10	10
29...	79	--	--	--	--	--	--
29...	78	.30	.62	.92	.050	20	<10
29...	76	.29	.57	.86	.050	<10	<10

322819097483201 LAKE GRANBURY SITE IC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1505	1.00	1210	7.8	16.5	7.9	83
29...	1507	10.0	1210	7.7	15.5	7.1	72
29...	1509	19.0	1210	7.7	15.5	6.2	63

323318097480101 LAKE GRANBURY SITE JC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
29...	1523	1.00	1520	7.7	18.5	7.6	82
29...	1525	10.0	1520	7.7	18.5	7.6	82
29...	1527	24.0	1520	7.7	18.5	7.3	78

TABLE 26--CHEMICAL-QUALITY SURVEY OF LAKE GRANBURY, OCTOBER 29, 1981--continued

323435097492001 LAKE GRANBURY SITE KC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)
OCT									
29...	1545	1.00	1570	7.6	19.0	.30	7.5	82	320
29...	1546	.50	--	--	--	--	--	--	--
29...	1547	10.0	1570	7.7	19.0	--	7.6	83	--
29...	1549	18.0	1570	7.7	19.0	--	7.3	79	320

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT									
29...	220	93	22	200	5.1	5.4	100	200	330
29...	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--
29...	220	91	22	200	5.2	5.5	100	190	330

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
29...	7.0	918	.48	.66	1.1	.040	<10	13
29...	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--
29...	6.9	906	.50	.63	1.1	.040	<10	13

TABLE 27--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, AUGUST 12, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

315214097222001 WHITNEY LAKE SITE AL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)
AUG					
12...	1200	1.00	1950	8.2	29.5
12...	1202	10.0	1950	8.2	29.0
12...	1204	20.0	1950	8.1	29.0
12...	1206	30.0	1950	8.1	29.0
12...	1208	40.0	1960	7.5	29.0

315203097222601 WHITNEY LAKE SITE AC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
AUG										
12...	1740	1.00	1950	8.2	29.5	1.50	7.7	101	K2	K580
12...	1741	2.50	--	--	--	--	--	--	--	--
12...	1742	10.0	1950	8.1	29.0	--	7.3	96	--	--
12...	1744	20.0	1950	7.9	29.0	--	5.9	78	--	--
12...	1746	30.0	1950	7.6	28.5	--	4.0	52	--	--
12...	1748	40.0	1960	7.4	28.0	--	2.5	32	--	--
12...	1752	60.0	2030	7.2	25.0	--	.5	6	--	--
12...	1754	70.0	2070	7.2	24.0	--	.5	6	--	--
12...	1756	80.0	2150	7.3	23.0	--	.5	6	--	--
12...	1758	90.0	2190	7.4	22.0	--	.6	7	--	--
12...	1800	102	2200	7.5	20.5	--	.6	7	--	--

DATE	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)
AUG									
12...	340	240	96	25	270	6.8	5.9	100	230
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	390	240	110	28	300	6.6	6.3	150	230

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG									
12...	450	.3	4.6	1140	<.09	.69	.010	<10	27
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	<.09	.89	.020	10	10
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	500	--	--	--	<.09	1.60	.270	150	1400

TABLE 27--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, AUGUST 12, 1981

315432097234601 WHITNEY LAKE SITE CC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
AUG							
12...	1340	1.00	1950	8.2	30.0	8.3	111
12...	1342	10.0	1950	8.2	29.5	7.8	103
12...	1344	20.0	1950	8.0	29.5	6.7	88
12...	1346	30.0	1950	7.8	29.0	5.3	70
12...	1348	40.0	1990	7.3	28.0	.8	10
12...	1350	50.0	2020	7.2	26.5	.4	5
12...	1352	60.0	2050	7.2	25.5	.5	6
12...	1354	70.0	2060	7.3	24.5	.6	7
12...	1356	80.0	2120	7.3	23.5	.8	10
12...	1358	87.0	2180	7.3	23.0	1.2	14

315722097240201 WHITNEY LAKE SITE DC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)
AUG									
12...	1420	1.00	1900	8.2	30.5	1.50	8.3	112	<1
12...	1422	10.0	1900	8.2	30.0	--	7.9	105	--
12...	1424	20.0	1900	7.9	29.5	--	5.8	76	--
12...	1426	30.0	1900	7.7	29.0	--	4.8	63	--
12...	1428	40.0	1940	7.2	28.0	--	.3	4	--
12...	1430	50.0	1950	7.2	26.0	--	.3	4	--
12...	1432	60.0	1970	7.2	25.0	--	.4	5	--
12...	1434	75.0	2090	7.2	24.0	--	.7	8	--

DATE	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, IONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)
AUG									
12...	K13	330	230	92	24	260	6.6	5.9	100
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	-	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	390	240	110	28	280	6.2	6.4	150

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG									
12...	200	430	4.8	1080	<.09	.68	.020	<10	7
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	<.09	.81	.020	30	30
12...	--	--	--	--	<.09	.74	.030	20	150
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	220	460	8.6	1200	<.09	1.80	.230	150	1100

TABLE 27--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, AUGUST 12, 1981

320122097260901 WHITNEY LAKE SITE FC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)
AUG							
12...	1545	1.00	1830	8.2	30.5	1.10	8.5
12...	1547	10.0	1830	7.9	29.5	--	6.3
12...	1549	20.0	1830	7.6	29.0	--	4.2
12...	1551	30.0	1830	7.5	29.0	--	3.8
12...	1553	40.0	1840	7.5	29.0	--	3.2
12...	1555	50.0	1860	7.3	26.5	--	.5
12...	1557	57.0	1900	7.2	26.0	--	.8

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG						
12...	115	<.09	1.20	.030	20	40
12...	83	--	--	--	--	--
12...	55	--	--	--	--	--
12...	50	--	--	--	--	--
12...	42	<.09	1.00	.030	20	90
12...	6	<.09	1.90	.200	160	2100
12...	10	<.09	2.20	.280	150	1700

315907097222801 WHITNEY LAKE SITE P7

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)
AUG							
12...	1510	1.00	1900	8.3	30.5	1.20	8.9
12...	1512	10.0	1900	8.0	29.5	--	6.4
12...	1514	20.0	1900	7.6	29.5	--	3.6
12...	1516	30.0	1900	7.5	29.0	--	3.3
12...	1518	40.0	1900	7.2	29.0	--	.4
12...	1520	47.0	1900	7.3	27.5	--	.7

DATE	OXYGEN DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG						
12...	120	<.09	.96	.030	10	40
12...	84	--	--	--	--	--
12...	47	--	--	--	--	--
12...	43	--	--	--	--	--
12...	5	--	--	--	--	--
12...	9	<.09	1.50	.020	170	1800

TABLE 27--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, AUGUST 12, 1981--continued

320401097291301 WHITNEY LAKE SITE P11

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)
AUG									
12...	1630	1.00	1780	8.3	32.0	.70	10.3	141	K2
12...	1631	1.10	--	--	--	--	--	--	--
12...	1632	10.0	1780	7.5	30.0	--	3.5	47	--
12...	1634	20.0	1790	7.4	29.5	--	1.7	22	--
12...	1636	27.0	1790	7.2	29.5	--	.6	8	--

DATE	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)
AUG									
12...	160	330	210	94	24	240	6.1	6.0	120
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	350	230	99	24	240	6.0	6.1	120

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG									
12...	220	390	7.4	1050	<.09	.94	.040	<10	9
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	<.09	.99	.040	10	20
12...	--	--	--	--	--	--	--	--	--
12...	230	390	8.1	1070	<.09	.95	.070	41	240

315500097204001 WHITNEY LAKE SITE P15

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG												
12...	1230	1.00	1950	8.3	30.0	7.7	103	<.09	.74	.010	20	10
12...	1232	10.0	1950	8.2	29.5	7.5	99	--	--	--	--	--
12...	1234	20.0	1950	8.0	29.0	7.5	99	--	--	--	--	--
12...	1236	27.0	1950	7.7	29.0	7.5	99	<.09	.97	.040	20	50

TABLE 28--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, OCTOBER 30, 1981

[UMHOS = micromhos per centimeter at 25° Celsius; DEG C = degrees Celsius; MG/L = milligrams per liter; UG/L = micrograms per liter]

315203097222601 WHITNEY LAKE SITE AC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
30...	1125	1.00	1550	7.6	19.0	.50	7.1	76	K8	K20
30...	1126	.90	--	--	--	--	--	--	--	--
30...	1127	10.0	1550	7.6	19.0	--	7.0	74	--	--
30...	1129	20.0	1550	7.6	19.0	--	7.0	74	--	--
30...	1131	30.0	1550	7.6	19.0	--	7.0	74	--	--
30...	1133	40.0	1550	7.6	19.0	--	7.0	74	--	--
30...	1135	50.0	1580	7.5	19.0	--	7.0	74	--	--
30...	1137	60.0	1620	7.5	19.0	--	6.9	73	--	--
30...	1139	70.0	1670	7.5	19.0	--	6.8	72	--	--
30...	1141	80.0	1680	7.5	19.0	--	6.8	72	--	--
30...	1143	90.0	1690	7.5	19.0	--	6.8	72	--	--
30...	1145	100	1690	7.5	19.0	--	6.8	72	--	--
30...	1147	109	1700	7.4	19.0	--	7.1	76	--	--

DATE	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM AD-SORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT										
30...	290	200	82	20	200	5.5	5.5	87	180	340
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
30...	320	230	89	23	220	5.7	6.0	89	210	380

DATE	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT									
30...	.3	5.7	886	.34	.71	1.1	.040	<10	<1
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	.25	.61	.86	.050	40	10
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	6.0	988	.34	.82	1.2	.050	18	10

TABLE 28--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, OCTOBER 30, 1981--continued

315214097222001 WHITNEY LAKE SITE AL

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
30...	1200	1.00	1550	7.6	19.5	7.0	75
30...	1202	10.0	1550	7.5	19.5	6.9	74
30...	1204	20.0	1550	7.6	19.5	7.0	75
30...	1206	30.0	1550	7.6	19.5	7.0	75
30...	1208	40.0	1560	7.5	19.5	7.0	75
30...	1210	53.0	1560	7.5	19.5	6.8	73

315432097234601 WHITNEY LAKE SITE CC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)
OCT							
30...	1053	1.00	1580	7.6	19.0	7.8	83
30...	1055	10.0	1580	7.6	19.0	7.8	83
30...	1057	20.0	1590	7.6	19.0	7.9	84
30...	1059	30.0	1590	7.6	19.0	8.0	85
30...	1101	40.0	1590	7.6	19.0	8.0	85
30...	1103	50.0	1740	7.5	19.0	8.1	86
30...	1105	60.0	1740	7.5	18.5	8.2	86
30...	1107	70.0	1740	7.5	18.5	8.2	86
30...	1109	80.0	1750	7.5	18.5	8.1	85
30...	1111	90.0	1750	7.5	18.5	8.3	87
30...	1113	99.0	1750	7.5	18.5	8.2	86

TABLE 28--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, OCTOBER 30, 1981--continued

315722097240201 WHITNEY LAKE SITE DC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
30...	1023	40.0	1740	7.6	18.5	--	7.9	84	--	--
30...	1025	50.0	1750	7.6	18.5	--	7.9	84	--	--
30...	1027	60.0	1750	7.6	18.0	--	8.3	87	--	--
30...	1029	70.0	1760	7.6	18.0	--	8.3	87	--	--
30...	1031	80.0	1760	7.6	18.0	--	8.1	85	--	--
30...	1033	89.0	1760	7.6	18.0	--	7.2	76	--	--

DATE	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)
OCT									
30...	300	210	85	21	210	5.6	5.7	87	200
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	330	240	93	24	230	5.9	5.9	89	230

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT									
30...	350	5.8	930	.34	.68	1.0	.030	<10	1
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	.31	.62	.93	.030	40	10
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	380	6.0	1020	.26	.78	1.0	.040	<10	10

320122097260901 WHITNEY LAKE SITE FC

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)
OCT							
30...	1330	1.00	1690	7.5	18.0	.40	7.3
30...	1332	10.0	1690	7.5	18.0	--	7.2
30...	1334	20.0	1690	7.5	18.0	--	7.2
30...	1336	30.0	1690	7.5	18.0	--	7.1
30...	1338	40.0	1690	7.5	18.0	--	7.2
30...	1340	50.0	1690	7.5	18.0	--	7.2
30...	1342	62.0	1690	7.5	18.0	--	7.1

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT							
30...	76	.15	.93	1.1	.060	<10	10
30...	75	--	--	--	--	--	--
30...	75	--	--	--	--	--	--
30...	74	.14	.60	.74	.050	50	10
30...	75	--	--	--	--	--	--
30...	75	--	--	--	--	--	--
30...	74	.26	.60	.86	.050	<10	10

TABLE 28--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, OCTOBER 30, 1981--continued

315907097222801 WHITNEY LAKE SITE P7

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)
OCT							
30...	1300	1.00	1720	7.6	19.0	.50	7.3
30...	1302	10.0	1730	7.5	19.0	--	7.0
30...	1304	20.0	1730	7.5	19.0	--	6.9
30...	1306	30.0	1770	7.5	18.5	--	7.2
30...	1308	40.0	1770	7.6	18.5	--	7.2
30...	1310	50.0	1770	7.6	18.5	--	7.3
30...	1312	60.0	1770	7.6	18.5	--	7.2

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT							
30...	78	.26	.76	1.0	.030	20	10
30...	74	--	--	--	--	--	--
30...	73	--	--	--	--	--	--
30...	76	--	--	--	--	--	--
30...	76	--	--	--	--	--	--
30...	77	--	--	--	--	--	--
30...	76	.27	.66	.93	.040	30	20

320401097291301 WHITNEY LAKE SITE P11

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
30...	1400	1.00	1630	7.6	18.0	.30	7.5	79	K110	70
30...	1401	.60	--	--	--	--	--	--	--	--
30...	1402	10.0	1630	7.6	18.0	--	7.5	79	--	--
30...	1404	20.0	1630	7.6	18.0	--	7.3	77	--	--
30...	1406	31.0	1630	7.6	18.5	--	7.1	76	--	--

DATE	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)
OCT									
30...	310	220	88	22	210	5.5	5.6	87	210
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	310	220	88	22	210	5.5	5.9	91	210

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT									
30...	350	6.0	944	.29	.76	1.1	.060	<10	2
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	.28	.59	.87	.040	20	10
30...	350	6.1	947	.27	.67	.94	.040	<10	2

TABLE 28--CHEMICAL-QUALITY SURVEY OF WHITNEY LAKE, OCTOBER 30, 1981--continued

315500097204001 WHITNEY LAKE SITE P15

DATE	TIME	SAMPLING DEPTH (FEET)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (M)	OXYGEN, DISSOLVED (MG/L)
OCT							
30...	1223	1.00	1540	7.7	19.0	.60	7.6
30...	1225	10.0	1540	7.7	19.0	--	7.4
30...	1227	20.0	1550	7.6	19.0	--	7.2
30...	1229	32.0	1590	7.4	19.0	--	6.4

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT							
30...	81	.19	.63	.82	.050	<10	10
30...	79	--	--	--	--	--	--
30...	77	--	--	--	--	--	--
30...	68	<.09	.89	--	.060	10	20

* U.S. GOVERNMENT PRINTING OFFICE: 1984 752-520