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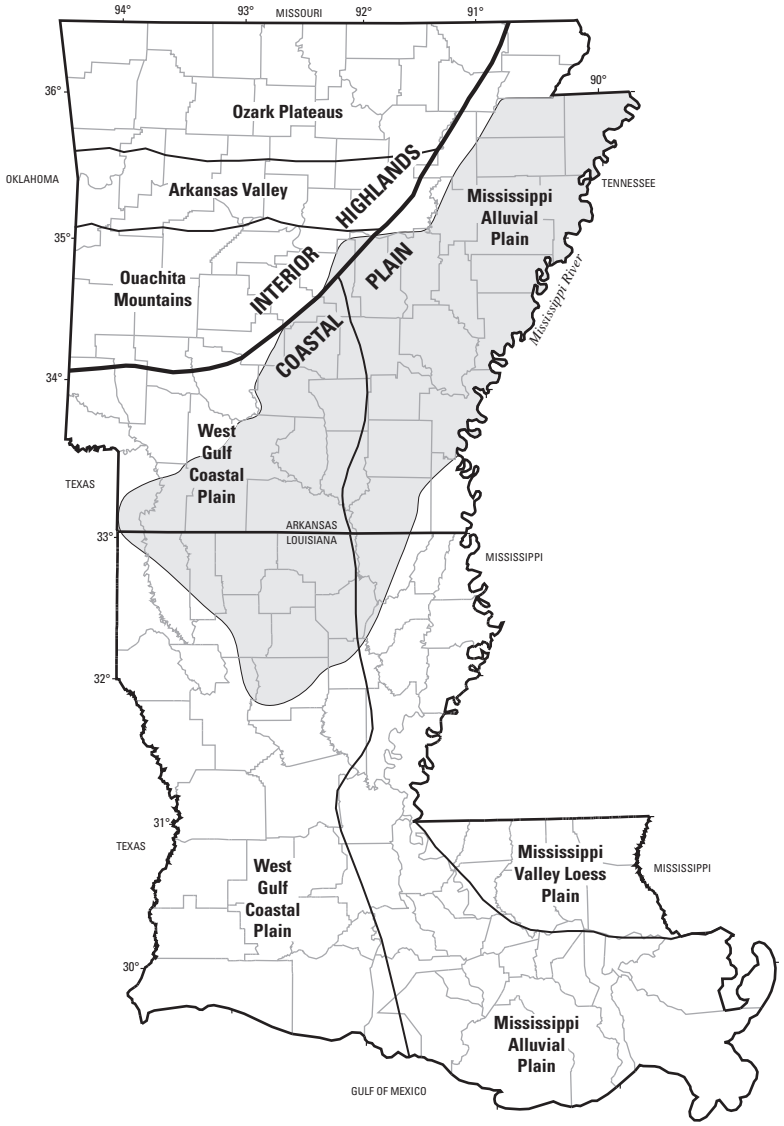
Status of Water Levels and Selected Water-Quality Conditions in the Sparta-Memphis Aquifer in Arkansas and the Status of Water Levels in the Sparta Aquifer in Louisiana, Spring 2005



Scientific Investigations Report 2007–5029

U.S. Department of the Interior
U.S. Geological Survey

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[In pocket]

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Conversion Factors, Vertical Datum, and Abbreviations

Multiply	By	To obtain
	Length	
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Flow rate	
foot per year (ft/yr)	0.3048	meter per year (m/yr)
million gllons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)

Temperature in degrees Celsius (˚C) may be converted to degrees Fahrenheit (˚F) as follows:

$$˚F = (1.8 \times ˚C) + 32$$

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD of 1929).

Horizontal coordinate information is referenced to the North american Datum of 1983 (NAD of 1983).

Status of Water Levels and Selected Water-Quality Conditions in the Sparta-Memphis Aquifer in Arkansas and the Status of Water Levels in the Sparta Aquifer in Louisiana, Spring 2005

By T.P. Schrader and J.S. Jones

Abstract

The U.S. Geological Survey in cooperation with the Arkansas Natural Resources Commission, the Arkansas Geological Commission, and the Louisiana Department of Transportation and Development has monitored water levels in the Sparta Sand of Claiborne Group and Memphis Sand of Claiborne Group since the 1920's. Ground-water withdrawals have increased while water levels have declined since monitoring was initiated. This report has been produced to describe ground-water levels in the aquifers in the Sparta Sand and Memphis Sand and provide information for the management of this valuable resource.

The 2005 potentiometric-surface map of the aquifers in the Sparta Sand and Memphis Sand was constructed using water-level data collected in 333 wells in Arkansas and 120 wells in Louisiana during the spring of 2005. The highest water-level altitude measured in Arkansas was 327 feet above National Geodetic Vertical Datum of 1929 located in Grant County in the outcrop at the western boundary of the study area; the lowest water-level altitude was 189 feet below National Geodetic Vertical Datum of 1929 in Union County. The highest water-level altitude measured in Louisiana was 246 feet above National Geodetic Vertical Datum of 1929 located in Bossier Parish in the outcrop area near the western boundary of the study area; the lowest water-level altitude was 226 feet below National Geodetic Vertical Datum of 1929 in central Ouachita Parish.

Three large depressions centered in Columbia, Jefferson, and Union Counties in Arkansas are the result of large withdrawals for industrial and public supplies. In Louisiana, three major pumping centers are in Ouachita, Jackson, and Lincoln Parishes. Water withdrawals from these major pumping centers primarily is used for industrial and public-supply purposes. Withdrawals from Ouachita and Lincoln Parishes and Union County, Arkansas, primarily for industrial purposes, have caused the resulting cones of depression to coalesce so that the -40 foot potentiometric contour encircles the three pumping centers.

Seven smaller depressions are evident on the 2005 Sparta-Memphis potentiometric-surface map located in Webster and Winn Parishes, Louisiana, and Calhoun, Cleveland, western Columbia, Desha, and Lafayette Counties, Arkansas. The depression in Calhoun County initially was shown in the 1996-1997 potentiometric surface. The depression in Desha County initially was shown in the 1999 potentiometric surface. The depressions in Webster and Winn Parishes were shown as early as 1975. The depressions in Cleveland, western Columbia, and Lafayette Counties initially were shown in the 2003 potentiometric surface.

A map of differences in water-level measurements between 2001 and 2005 was constructed using the difference between water-level measurements from 294 wells in Arkansas and 29 wells in Louisiana. The difference in water levels between 2001 and 2005 ranged from -30.1 to 44.6 feet. The largest rise of 44.6 feet in water level measured was in Union County in Arkansas. The largest decline of 30.1 feet in water level measured was in Columbia County in Arkansas. Areas with a general rise in water levels in Arkansas are shown in Arkansas, Columbia, Craighead, Jefferson, Prairie, and the western half of Union Counties. The area around west-central Union County had rises as much as 44.6 feet, with seven wells showing a rise of 20 feet or greater, which is an annual rise of 5 feet or greater. Areas in Arkansas with a general decline in water level are shown in western Bradley, eastern Calhoun, Cleveland, Cross, Desha, Drew, Lafayette, Lee, Lincoln, Lonoke, Poinsett, and the eastern half of Union Counties.

In Louisiana, the water-level difference map showed a general rise in water levels in northern Claiborne, northern Webster, and northwestern Union Parishes mainly because of a decrease in industrial withdrawals in southern Arkansas, particularly Union County. Another rise in water level was indicated in western Jackson Parish where industrial withdrawals have been reduced. The remainder of the study area in Louisiana showed a general decline in water level ranging from –1.5 feet in Jackson Parish to -6.1 feet in Union Parish.

Hydrographs were constructed for wells with a minimum of 25 years of water-level measurements. In Arkansas, the mean annual water-level rose only in Columbia, Lafayette, and Ouachita Counties. Mean annual declines occurred in Dallas, Grant, Phillips, Woodruff, Calhoun, Cleveland, Craighead, Cross, Desha, Drew, Jefferson, Lee, Union, Arkansas, Bradley, Lincoln, Lonoke, Poinsett, and Prairie Counties in Arkansas. In Louisiana, hydrographs were constructed using a minimum of 25 years of water-level measurements. At well Cl-149 in Claiborne Parish, a decline in water level is evident from 1981 until late 1999 at a rate of approximately -1.7 feet per year. Since 1999, a water-level increase of approximately 1.1 feet per year is evident at Cl-149, mainly because of a reduction of industrial withdrawals in Union County, Arkansas.

Water samples were collected from 61 wells in the spring of 2005 and measured onsite for specific conductance and temperature in Arkansas. Specific conductance ranged from 32.7 microsiemens per centimeter in Ouachita County to 1,356 microsiemens per centimeter in Lee County. The median specific conductance was 278 microsiemens per centimeter and the mean specific conductance was 362 microsiemens per centimeter. Along the western border of the Sparta-Memphis aquifer in Arkansas near the outcrop area, ground water has low specific conductance—generally less than 200 microsiemens per centimeter. Specific conductance increases to the east and south. The statistical distribution of specific conductance values in 2005 has changed from the distribution of specific conductance values in 2003.

Introduction

The U.S. Geological Survey (USGS) in cooperation with the Arkansas Natural Resources Commission, the Arkansas Geological Commission, and the Louisiana Department of Transportation and Development has monitored water levels in the Sparta Sand of Claiborne Group and Memphis Sand of Claiborne Group (herein the geologic formations are referred to as the Sparta Sand and the Memphis Sand, respectively), since the 1920's. Ground-water withdrawals have increased while water levels have declined since monitoring was initiated. This report describes results from two continuing projects that include the ground-water networks and basic data collection for Arkansas and Louisiana. The USGS has produced separate and combined reports, at various periodic schedules, discussing the ground-water conditions of the Sparta-Memphis aquifer in Arkansas and the Sparta aquifer in Louisiana. A combined report for Arkansas and Louisiana has been produced every 4 years since 1997 to describe ground-water levels in these aquifers and provide information for the management of this valuable resource.

This report presents a status of water levels in the Sparta-Memphis aquifer in Arkansas and the Sparta aquifer in Louisiana, and water-quality conditions in the Sparta-Memphis aquifer in Arkansas. Herein, aquifers in the Sparta Sand and Memphis Sand will be referred to as the Sparta-Memphis aquifer throughout Arkansas and Louisiana. During the spring of 2005, 333 water levels in Arkansas and 120 water levels in Louisiana were measured in wells completed in the Sparta-Memphis aquifer. These measurements were used to provide information describing the potentiometric surface of the Sparta-Memphis aquifer. During the spring of 2005, 61 water-quality samples were collected and measured for temperature and specific conductance from wells completed in the Sparta-Memphis aquifer in Arkansas. Water-quality data were not measured for Louisiana. This report presents results as a potentiometric-surface map, a water-level difference map comparing water levels from 2001 to 2005, selected water-level hydrographs, a specific-conductance map for the Arkansas part of the aquifer, and water-level and water-quality data tables.

The study area (fig. 1) in Arkansas is bounded on the north by the Missouri State line, and on the east by the Tennessee and Mississippi State lines. The western boundary is defined as the western extent of the outcrop and subcrop (Hosman, 1982) of the Sparta Sand and the Memphis Sand. In Louisiana, the area is bounded on the south and east by the approximate downdip limit of freshwater (Payne, 1968) (plate 1) and the western boundary is defined by the western extent of the Sparta Sand aquifer. The Sparta Sand and the Memphis Sand occur in Arkansas and the Sparta Sand occurs in Louisiana. Water levels in the Sparta Sand aquifer generally correlate with those in the Memphis Sand aquifer; therefore, the water-bearing formations are considered to be one hydrologic unit (Stanton, 1997).

The authors acknowledge the contribution of data and the technical assistance of their staff, particularly Jeffrey A. Brantly and Ralf F. Montanus.

Water Use

Water use in the Sparta-Memphis aquifer in Arkansas generally has increased from 1980 to 2000 (fig. 2). In 1980 water use in the Sparta-Memphis aquifer in Arkansas was about 185 million gallons per day (Mgal/d) (Holland and Ludwig, 1981). There was a decline in water use to about 157 Mgal/d in 1985 (Holland, 1987). In 2000, water use in the Sparta-Memphis aquifer in Arkansas was about 287 Mgal/d (Holland, 2004), an increase of 55 percent from 1980.

Water use from the Sparta-Memphis aquifer in Arkansas in 2000 was divided among three primary categories— irrigation, public supply, and industrial. Irrigation used about 175 Mgal/d (61 percent), public supply used about 55 Mgal/d (19 percent), and industrial used about 49 Mgal/d (17 percent). Agriculture and power generation accounted for about 1 percent each of the water use in the Sparta-Memphis aquifer in Arkansas in 2000. Major pumping centers that use the Sparta-Memphis aquifer for public supply and industry occur in Columbia, Jefferson, and Union Counties. Arkansas, Lonoke, Monroe, and Prairie

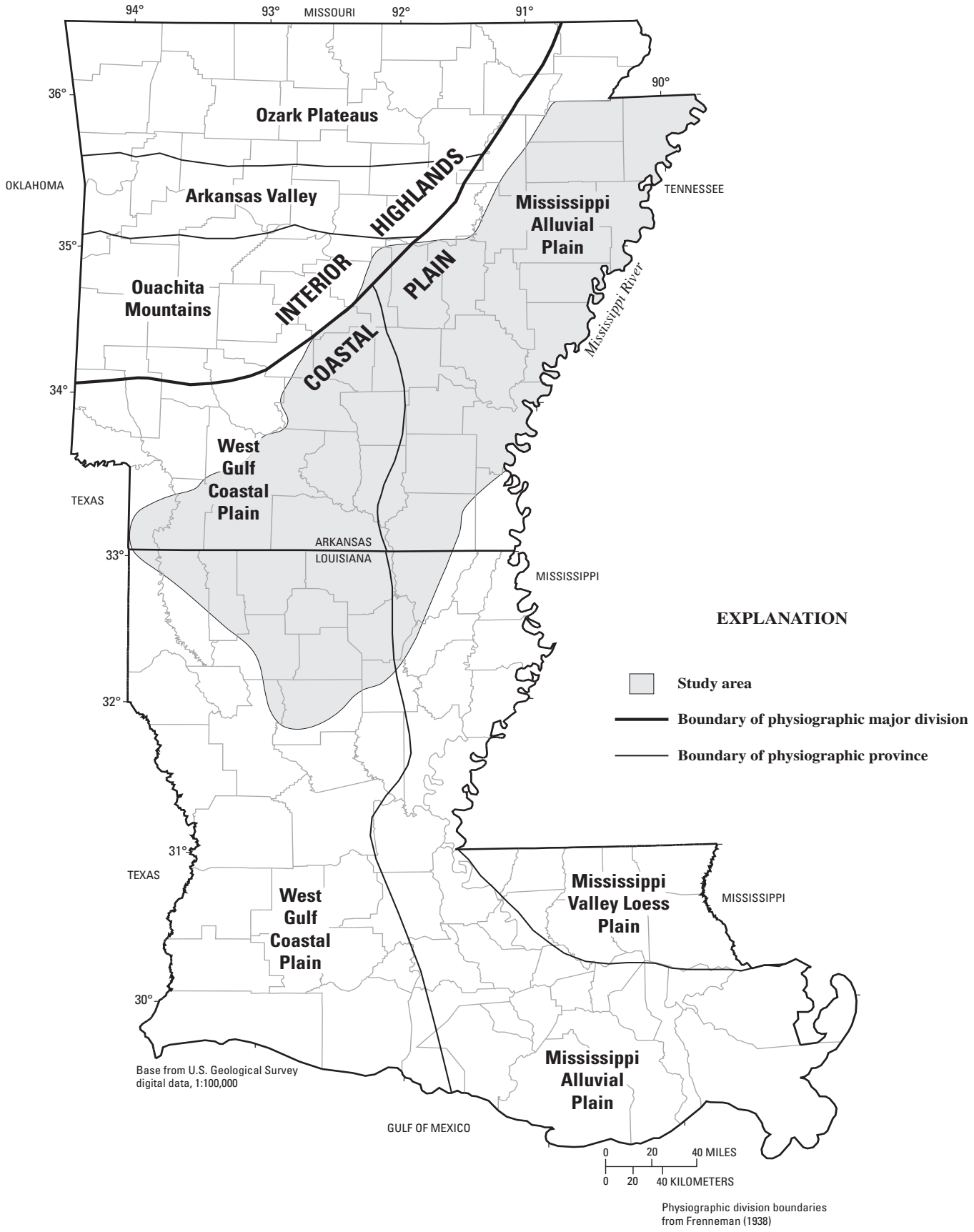

Figure 1. Location of study area.

Counties accounted for the majority of the water withdrawn for irrigation from the Sparta-Memphis aquifer in 2000 (Holland, 2004).

Water use from the Sparta-Memphis aquifer in Louisiana was approximately 68 Mgal/d in 2000 (Sargent, 2002). Of that amount, approximately 38 Mgal/d (56 percent) was used for public supply, approximately 27 Mgal/d (40 percent) was used for industrial purposes, and the remaining 3 Mgal/d (4 percent) was used for rural domestic, livestock, irrigation, and aquaculture. Water use in the Sparta-Memphis aquifer in 2000 (68 Mgal/d) decreased approximately 3 Mgal/d (4 percent) from the amount used in 1995 (71 Mgal/d) (Lovelace and Johnson, 1996).

The Sparta-Memphis aquifer in Louisiana has three major pumping centers that accounted for more than 65 percent of the total withdrawals from the Sparta Sand aquifer in 2000 (Sargent, 2002). Major pumping centers are located in Ouachita, Bienville, and Lincoln Parishes. In 2000, Ouachita and Bienville Parishes used approximately 23.2 and 12.3 Mgal/d, respectively, mainly for industrial purposes. Lincoln Parish used approximately 8.9 Mgal/d, mainly for public-supply purposes.

Total water use in the Sparta-Memphis aquifer in Arkansas and Louisiana generally increased from 1980 to 1995, then remained the same until 2000 (fig. 2). In 1980, total water use in Arkansas and Louisiana was about 251 Mgal/d. In 1995 and 2000, total water use in Arkansas and Louisiana was about 355 Mgal/d, an increase of 41 percent over the 1980 total water use.

Well-Numbering System

The well-numbering system used in this report is based upon the location of the wells according to the Federal land survey used in Arkansas. The component parts of a well number are the township designation; the range designation; the section number; three letter designation that indicates, respectively, the quarter section, the quarter-quarter section, and the quarter-quarter-quarter section in which the well is located; and the sequence number of the well in the quarter-quarter-quarter section. The letters are assigned counterclockwise, beginning with "A" in the northeast quarter or quarter-quarter or quarter-quarter-quarter section in which the well is located. For example, well 01S03W04BBD16 (fig. 3) is located in Township 1 South, Range 3 West, in the southeast quarter of the northwest quarter of the northwest quarter of section 4. This well is the 16th well in this quarter-quarter-quarter section of section 4 from which data were collected.

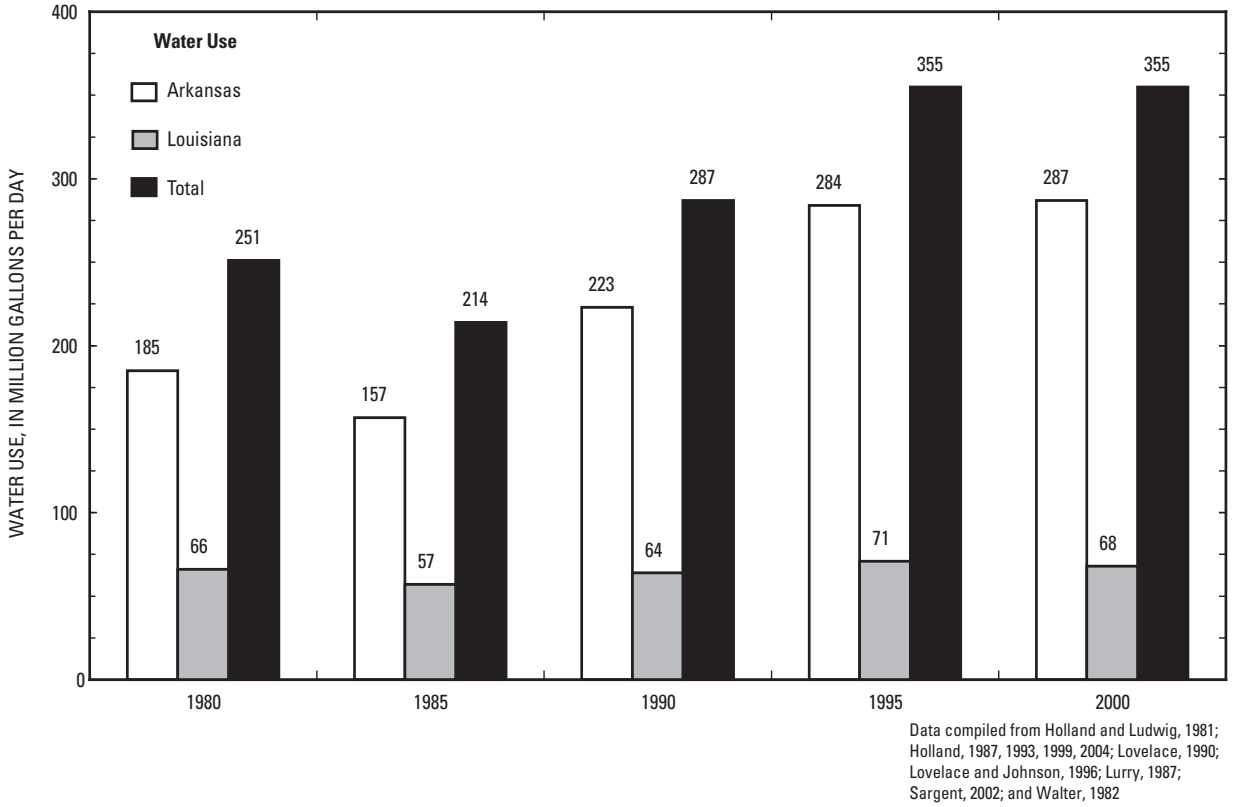

Figure 2. Water use in the Sparta-Memphis aquifer in Arkansas and Louisiana, 1980-2000.

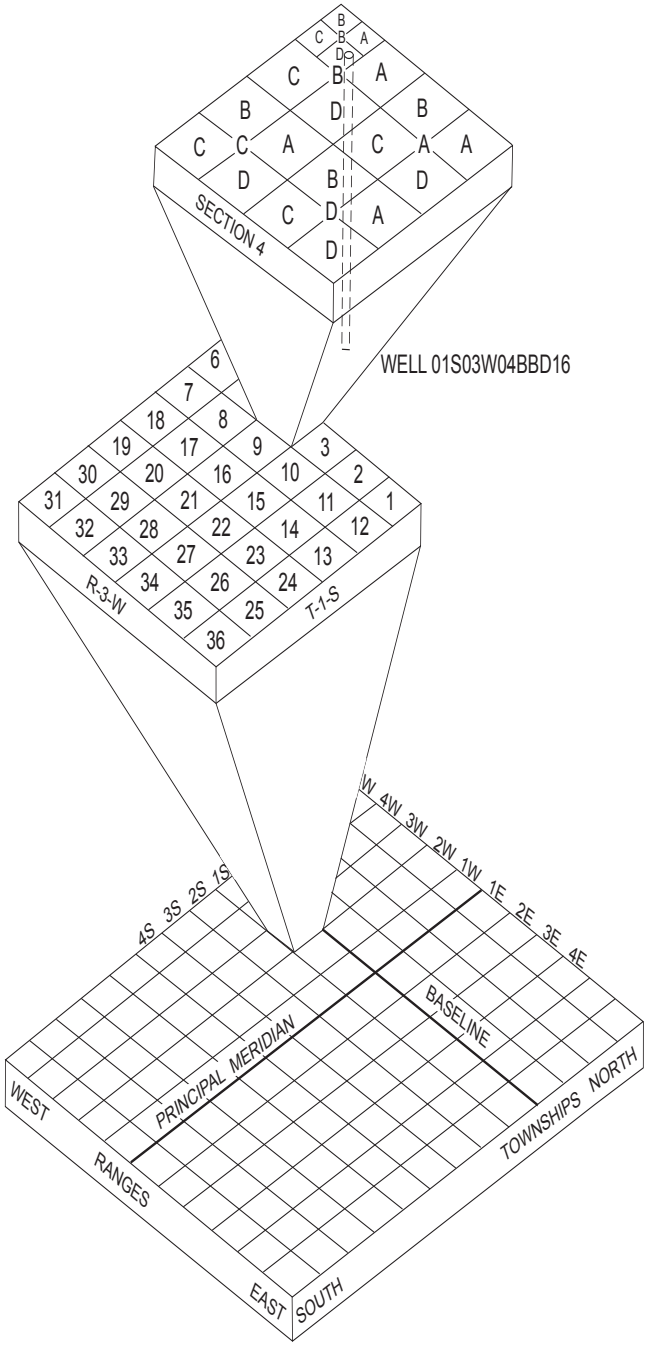

Figure 3. Well-numbering system.

In Louisiana, wells are identified by the Parish abbreviation followed by a sequence number based on the registration date of the well. For example, well Ou-80 is identified by the Ouachita Parish abbreviation (Ou), followed by a sequence number (80) corresponding to the date on which the well was registered with the State of Louisiana.

Methods

USGS personnel measured water levels from March 2005 to May 2005 from wells completed in the Sparta-Memphis aquifer. Measurements were made using steel or electric tapes graduated in hundredths of a foot. The steel and electric tapes were calibrated prior to collecting water-level measurements. Calibration was performed by comparing the steel or electric tapes to a standardized steel tape used only for calibration.

Wells locations were verified using Global Positioning System (GPS) receivers to acquire the horizontal coordinate information, latitude and longitude, based on the North American Datum of 1983. The latitude and longitude of the wells in Arkansas were recorded from a GPS accurate to one-tenth of a second of latitude and longitude (approximately 10-20 feet (ft)). The latitude and longitude of the well location were transferred to a topographic map and the altitude of the well (National Geodetic Vertical Datum of 1929) was determined from the topographic contours at the location on the map. Altitude is accurate to about one-half of the contour interval of the topographic map.

In Arkansas, water-quality samples were collected for specific-conductance analysis using the procedures described in the "National Field Manual for the Collection of Water-Quality Data" (U.S. Geological Survey, variously dated). Wells were purged a minimum of three-casing volumes. During the well purge, specific conductance and temperature were monitored until measurements stabilized. If the specific conductance and temperature were unstable, the well purge continued past the minimum three-casing volumes until specific-conductance and temperature values stabilized.

Specific-conductance data were measured from selected Arkansas wells using specific-conductance meters with temperature compensation. Specific-conductance meters were calibrated twice daily by comparing the measurement of the meter of two specific conductance calibration solutions. Specific conductance is a measure of the electrical conductance of a substance. As the dissolved-solids concentration in ground water increases, specific conductance increases. Specific-conductance data were not measured in Louisiana.

Description of Aquifer

The Sparta Sand and Memphis Sand (table 1) of Eocene age mainly consist of fine to medium sand. Some silt, clay, and lignite occur in the upper portion of the Sparta Sand and Memphis Sand. Sands in the Sparta Sand were deposited by shifting streams on a deltaic-fluvial flood plain (Payne, 1968). These sands mostly are interconnected, but separately identifiable sands can be traced for short distances (Snider and others, 1972). The Cook Mountain Formation of Claiborne Group overlies the Sparta Sand and serves as an upper confining unit (table 1). The permeable units of the Sparta Sand and the Memphis Sand compose the Sparta and Memphis aqui-

Table 1. Stratigraphic correlation of Louisiana and the north and south parts of Arkansas for the study area.

[Compiled from Petersen and others, 1985; Tomaszewski and others, 2002]

<table>
<tr><th>Series</th><th>Group</th><th>Formations in Louisiana</th><th>Formations in the south part of Arkansas</th><th>Formations in the north part of Arkansas</th></tr>
<tr><td rowspan="8">Eocene</td><td>Jackson</td><td>Undifferentiated</td><td>Undifferentiated</td><td>Undifferentiated</td></tr>
<tr><td rowspan="5">Claiborne</td><td>Cockfield Formation</td><td>Cockfield Formation</td><td>Cockfield Formation</td></tr>
<tr><td>Cook Mountain Formation</td><td>Cook Mountain Formation</td><td>Cook Mountain Formation</td></tr>
<tr><td>Sparta Sand</td><td>Sparta Sand</td><td rowspan="3">Memphis Sand</td></tr>
<tr><td>Cane River Formation</td><td>Cane River Formation</td></tr>
<tr><td rowspan="2">Carrizo Sand</td><td>Carrizo Sand</td></tr>
<tr><td rowspan="2">Wilcox</td><td rowspan="2">Wilcox Group Undifferentiated</td><td rowspan="2">Wilcox Group Undifferentiated</td></tr>
<tr><td rowspan="2">Paleocene</td><td>Wilcox Group Undifferentiated</td></tr>
<tr><td>Midway</td><td>Undifferentiated</td><td>Undifferentiated</td><td>Undifferentiated</td></tr>
</table>

fers. The Sparta-Memphis aquifer occurs in Arkansas and the Sparta aquifer occurs in Louisiana. In this report, the aquifers are referred to as the Sparta-Memphis aquifers throughout the study area.

The Sparta Sand is composed of a sequence of alternating sand and clay beds between the massive clays of the overlying Cook Mountain Formation of Claiborne Group and the underlying Cane River Formation of Claiborne Group confining units (Hosman and others, 1968) shown in table 1. The Sparta Sand is in the southern part of the study area (south of about 35 degrees latitude, plate 1) where the Cane River Formation of Claiborne Group is composed predominantly of clay. The Memphis Sand is in the northern part of the study area (north of about 35 degrees latitude), and the Cane River Formation of Claiborne Group or equivalent facies is composed predominantly of sand. In the southern area, the Claiborne Group is subdivided into the Carrizo Sand, Cane River Formation, Sparta Sand, Cook Mountain Formation, and the Cockfield Formation (table 1). The equivalent section in the northern area is subdivided into the Memphis Sand, the Cook Mountain Formation, and the Cockfield Formation. The Memphis Sand in the northern area is equivalent to the Carrizo Sand, the Cane River Formation, and the Sparta Sand in the southern area. The Memphis Sand is underlain by a thick layer of clay in the upper part of the Wilcox Group (Hosman and others, 1968).

The Sparta Sand generally thickens and ground water increases in salinity as depth of occurrence increases to the southeast. The Sparta Sand is 50 to 200 ft thick within the outcrop area (along the western limit) and thickens easterly to nearly 900 ft. The Sparta Sand contains freshwater throughout most of its extent in Arkansas. However, saltwater is present in the extreme southeastern part of the State in parts of Ashley, Chicot, and Union Counties (Payne, 1968).

In Louisiana, the Sparta Sand generally dips to the east and southeast. Near the Sabine uplift in northwestern Louisiana (plate 1), the dip in northwestern Louisiana is northeasterly. The Sparta Sand is approximately 50 to 300 ft thick within the outcrop area and thickens easterly to nearly 700 ft near the downdip limit of freshwater. The approximate downdip limit of freshwater is shown on plate 1. Downdip from the limit of freshwater, most or all sands in the Sparta Sand aquifer contain saltwater; updip from the freshwater limit, sands in the upper part of the aquifer contain freshwater but some sands in the lower part of the aquifer contain saltwater. A more detailed description of the Sparta-Memphis aquifer (upon which the preceding descriptions are based) is provided by Edds and Fitzpatrick (1989), Hosman and others (1968), Payne (1968), Petersen and others (1985), and Ryals (1980).

Water Levels

Water-level measurements collected in wells screened in the Sparta-Memphis aquifer (appendix 1) were used to produce a regional potentiometric-surface map (plate 1). Water levels measured during the spring of 2005 were subtracted from water levels measured during the spring of 2001 at selected Sparta-Memphis aquifer wells (appendix 2) and were used to create a water-level difference map (plate 2). Data from wells that have water-level measurements with a minimum 25-year period of record were used to produce hydrographs shown in figure 4 and compiled by county for

Arkansas. The water levels shown in the hydrographs indicate long-term changes in hydrologic conditions. Long-term water-level declines shown in the hydrographs reflect the development of the depressions on the potentiometric surface.

Potentiometric-Surface Map

A potentiometric-surface map was constructed using 453 water-level measurements from wells completed in the Sparta-Memphis aquifer. Hydrologic principles, water-use data, and historical information are interpreted with the water-level data to delineate the potentiometric-surface contours. The number and location of wells used to construct potentiometric-surface maps differ from year to year. The combined information will result in both variations and similarities in potentiometric contours that define the surface depicted on the maps produced in different years.

The 2005 potentiometric-surface map of the Sparta-Memphis aquifer shows the altitude to which water would have stood in tightly cased wells completed in the aquifer (plate 1). The map is based upon water-level data collected in 333 wells in Arkansas and 120 wells in Louisiana (appendix 1), in the Sparta-Memphis aquifer during the spring of 2005. The surface is mapped by determining the altitude of the water levels measured in the wells and is represented on the map by contours that connect points of equal water-level altitude. The general direction of ground-water flow in the Sparta-Memphis aquifer is perpendicular to the contours in the direction of decreasing hydraulic gradient.

Cones of depression or potentiometric depressions, shaded in gray on plate 1, in Jefferson and Union Counties in Arkansas and Ouachita Parish in Louisiana, usually are caused by withdrawal rates that exceed the recharge rates within the aquifer over an extended period of time. When a well is pumped, the water level in and around the well declines, creating a slope or gradient on the potentiometric surface. The gradient increases the flow of water in the aquifer towards the lower water level. When pumping stops the water level recovers. In an area where withdrawal rates exceed the recharge rates in the aquifer, the area of the declining water level expands to form a cone of depression or potentiometric-surface depression. The depression can reach equilibrium when the flow rate increases with the expanding depression or the withdrawal rate decreases with the declining water level.

The natural direction of flow, which historically was eastward from the western limit and then southward, in the Sparta-Memphis aquifer is altered in areas by large ground-water withdrawals. The regional direction of ground-water flow in the Sparta-Memphis aquifer is generally to the south-southeast in the northern half of Arkansas and to the east and south in the southern half of Arkansas and Louisiana, away from the outcrop area except where affected by large ground-water withdrawals (Joseph, 1997, 2000). The highest water-level altitude measured in Arkansas was 327 ft above NGVD of 1929, located in Grant County in the outcrop at the western boundary of the study area; the lowest water-level altitude was 189 ft below NGVD of 1929 in Union County (appendix 1). The water level at this well in Union County was 10 ft higher than in 2003 (Schrader, 2006). The highest water-level altitude measured in Louisiana was 246 ft above NGVD of 1929, located in Bossier Parish in the outcrop area near the western boundary of the study area; the lowest water-level altitude was 226 ft below NGVD of 1929 in central Ouachita Parish.

Three large depressions are shown in Arkansas on the 2005 potentiometric-surface map, centered in Columbia, Jefferson, and Union Counties, as a result of large withdrawals for industrial and public supplies (Holland, 2004, 1999, 1993). The depression centered in Jefferson County deepened and expanded in recent years into Prairie County where withdrawals for agricultural, irrigation, and public supplies have increased from 22.6 Mgal/d in 1990 to 24.7 Mgal/d in 1995 to 27.7 Mgal/d in 2000 (Holland, 2004, 1999, 1993). This depression has approximately the same shape and depth as on the 2003 potentiometric-surface map (Schrader, 2006). The depressions in Columbia and Union Counties are elongated east to west because of large industrial withdrawals and coalesce at or near the Columbia and Union County line. The deepest measurement during 2005 in the center of the depression in Union County has risen by 10 feet since 2003. The area enclosed by the deepest contour, 180 ft below NGVD of 1929, is about one-third the area enclosed in the same contour in the 2001 potentiometric-surface map (Schrader, 2004). The depression in Union County has receded from Union Parish, Louisiana. The -100-ft contour had extended into Union Parish on the 2001 potentiometric-surface map (Schrader, 2004). The -60-ft contour on the 2005 potentiometric-surface map is near the Arkansas-Louisiana State border. The deepest water-level measurement in the depression in Columbia County was about 13 ft, 7 ft, and 10 ft below NGVD of 1929 in 2001, 2003, and 2005, respectively. This depression is similar in shape and depth as on the 2003 potentiometric-surface map. The fluctuations of a few feet in the deepest water-level measurement may be the result of variations in climate or variability in the location of withdrawals. The similarity of the shape and size with the 2003 potentiometric-surface map may suggest that this depression may be stabilizing in this configuration. Continued monitoring of the water level in this area will determine if this depression has stabilized, expanded, or declined in shape and depth.

A broad depression in western Poinsett and Cross Counties in Arkansas was first shown in the 1995 potentiometric-surface map (Stanton, 1997) and has been variable in size since 1995. The depression expanded in area in 1997 and 1999, then decreased in area in 2003 and 2005. In 1995, this depression was enclosed within the 150-foot contour in the southwestern corner of Poinsett County. In 1997, the depression covered most of the western half of Poinsett County (Joseph, 1997). In 1999 and 2001, the depression extended from Poinsett County through Cross County into St. Francis County (Joseph, 2000; Schrader, 2004). In 2003, the depression covered most of the western half of Poinsett County

(Schrader, 2006). In the 2005 potentiometric-surface map, the depression covers part of western Poinsett County and extends into northwestern Cross County. In 2001, the mapped contour interval was changed from 25-ft to 20-ft intervals, and the 20-ft interval has been used for potentiometric-surface maps since 2001. The 1999 and 2001 potentiometric maps indicate that this depression is similar in size and extent. This would suggest that the variability in size from 1995 to 2005 may not be because of the change in contour interval.

In Louisiana, three major pumping centers are shown on the 2005 potentiometric map in Ouachita, Jackson, and Lincoln Parishes. Water usage from these major pumping centers primarily is used for public and industrial supply purposes (Sargent, 2002). Withdrawals from Ouachita and Lincoln Parishes in Louisiana and Union County in Arkansas, used primarily for public supply and industrial purposes, have caused the resulting cones of depression to coalesce into the -40 ft potentiometric contour that encircles the three pumping centers.

Seven smaller depressions are evident on the 2005 Sparta-Memphis potentiometric-surface map located in Webster and Winn Parishes, Louisiana, and Calhoun, Cleveland, western Columbia, Desha, and Lafayette Counties, Arkansas. The depressions in Webster and Winn Parishes were evident on the 2001 potentiometric-surface map and were shown as early as 1975 (Ryals, 1980). These two depressions have increased in depth from 2001 to 2005. Two depressions in Calhoun and western Lincoln Counties in Arkansas were evident on the 2001 potentiometric-surface map (Schrader, 2004). The depression in Calhoun County appears to be stable since 2001 with similar shape and depth. This depression initially was shown on the 1996-1997 potentiometric-surface map (Joseph, 1997). The depression in western Lincoln County has merged with the large depression in Jefferson County on the 2005 potentiometric-surface map. The water level in the depression in Cleveland County has declined in well 09S11W01DCA1 from 24 ft above NGVD of 1929 to 18 ft above NGVD of 1929 since 2003, when this depression was initially shown in the potentiometric surface (Schrader, 2004). The water level in the depression in Desha County, at well 12S03W26CBB1, has declined from 61 ft above NGVD of 1929 in 1999 to 48 ft above NGVD of 1929 in 2005. This depression was connected to the cone of depression centered in Jefferson County in 2001, and initially was shown on the 1999 potentiometric-surface map (Joseph, 2000). Rising water levels in eastern Drew County separated the cone in Desha County from the larger cone centered in Jefferson County. In western Columbia and Lafayette Counties, the area and depth of the depressions are similar in 2003 and 2005. The depressions in western Columbia and Lafayette Counties were not shown on potentiometric surfaces prior to 2003.

Short-term variations in climate and withdrawals may account for these smaller depressions. Local increases in water withdrawals may result in the formation of long-term cones of depression. Continued monitoring of the Sparta-Memphis aquifer potentiometric surface could determine if these depressions are related to climate variations or withdrawals.

The potentiometric surface indicates that large withdrawals have altered or reversed the natural direction of flow in most areas. Flow in the areas surrounding the depression is toward the depression near the center of pumping. In the northern third of the study area, flow is from the east, west, and north towards the depression in Poinsett County. In the central third of the study area, flow is dominated by the depression centered in Jefferson County. Flow from all directions is towards the depression in Jefferson County, with the exception of Cleveland County. In Cleveland County the flow is primarily towards the southeast and northeast to the small depression centered in Cleveland County. In the southern third of the study area, flow is dominated by the three depressions in Union and Columbia Counties, Arkansas, and Ouachita Parish, Louisiana. Flow is radially towards the center of the depressions. In most of eastern Columbia County, flow is west towards the depression in the center of Columbia County. Near the Columbia-Union County line, flow reverses direction east towards the depression in Union County. In Ashley and Chicot Counties, flow is south-southwest. In Louisiana, flow generally is southeast from areas of recharge to areas of discharge, but is influenced by withdrawals from pumping centers in Union, Webster, Ouachita, Lincoln, Jackson, and Winn Parishes.

Water-Level Difference Map from 2001 to 2005

A water-level difference map (plate 2) was constructed using the difference between water-level measurements made during 2001 and 2005 from 294 wells in Arkansas and 29 wells in Louisiana (appendix 2). The difference in water level was calculated by subtracting the 2005 depth-to-water level from the 2001 depth-to-water level. Positive values indicate a rise and negative values indicate a decline in water level. Rises in the water level are indicated on plate 2 with blue triangles pointing upward; declines in the water level are indicated with red triangles pointing downward. Triangles are scaled to the relative value of the rise or decline. Water-level differences do not necessarily equate to a water-level trend, but are intended to show where water levels have increased or decreased from 2001 to 2005.

The difference in water level between 2001 and 2005 ranged from -30.1 to 44.6 ft. The largest rise (44.6 ft) in water level measured was in Union County in Arkansas. The largest decline (30.1 ft) in water level measured was in Columbia County in Arkansas. Between 1999 and 2003, a large public supply converted from a primary source of ground water to a primary source of surface water (Terrance W. Holland, U.S. Geological Survey, written commun., 2005). Withdrawals from the Sparta-Memphis aquifer in Columbia County decreased from about 29.1 Mgal/d in 1996 to 2.6 Mgal/d in 2000 and 1.2 Mgal/d in 2003. Withdrawals from the wells around the largest rise decreased from about 1.02 Mgal/d in

1996 to 0.03 Mgal/d in 2000 and 0.04 Mgal/d in 2003. The decrease in withdrawals resulted in the large rises in Columbia County. When public supply changed to surface water as the primary source, an industrial user decreased the amount of public-supplied water and increased self-supplied ground water. The well near the largest decline withdrew about 0.00 Mgal/d in 1996, 0.11 Mgal/d in 2000, and 0.10 Mgal/d in 2003 (Terrance W. Holland, U.S. Geological Survey, written commun., 2006); the increase in self-supplied ground water may have contributed to the largest decline in water level.

Areas with a general rise in water levels in Arkansas are shown in Arkansas, Columbia, Craighead, Jefferson, Prairie Counties and the western half of Union County (plate 2). The inset area on plate 2 indicates an expanded view of part of Union County. In the area around west-central Union County (plate 2) water levels rose as much as 44.6 ft, with seven wells rising 20 ft or greater, which is an average annual rise of 5 ft or greater. The rising water level around west-central Union County coincides with water conservation measures initiated in 1999 and the conversion of large industrial ground-water users to surface water from the Ouachita River in December, 2004 (Robert Reynolds, Union County Water Conservation Board, written commun., 2006). The area in Arkansas, Jefferson, Lonoke, and Prairie Counties indicates mostly rising water levels, the largest rise is 35.7 ft, with seven wells rising 20 ft or greater.

Areas in Arkansas with a general decline in water level are shown in western Bradley, eastern Calhoun, Cleveland, Cross, Desha, Drew, Lafayette, Lee, Lincoln, Lonoke, and Poinsett Counties; also the eastern half of Union County. Water levels in Lonoke County declined about -0.8 to -7.9 ft. The single large rise of 30.4 ft in Lonoke County was measured in a well with an inoperable pump and water was not withdrawn for several months in 2005. The area of western Bradley, eastern Calhoun, Cleveland, Desha, Drew, and Lincoln Counties indicate areas of mostly declines of less than 4.5 ft, with five large declines of 8.7, 9.6, 10.4, 10.7, and 12.0 ft. The area of Cross and Poinsett Counties are mostly declines of 4.0 ft or less, with the largest decline of 5.8 ft. Lafayette County declined about 3.1 ft or less. The eastern half of Union County declined in two wells 17.7 and 11.7 ft, with most of the declines being 5.2 ft or less. Lee County has declines from 3.6 to 8.4 ft.

In Louisiana, the water-level difference map (plate 2) indicated a general rise in water levels in northern Claiborne, northern Webster, and northwestern Union Parishes mainly because of a decrease in industrial ground-water withdrawals in southern Arkansas, particularly Union County. A rise in water level was indicated in western Jackson Parish where industrial withdrawals have been reduced. Rising water levels ranged from 0.6 ft in Claiborne Parish at well C1-116 to 10.3 ft in Jackson Parish at well Ja-49. The remainder of the study area in Louisiana indicated a general decline in water levels ranging from 1.5 ft in Jackson Parish at well Ja-148 to 6.1 ft in Union Parish at well Un-134.

Long-Term Hydrographs

Hydrographs were constructed for wells with a minimum of 25 years of water-level measurements. Selected hydrographs are shown in figure 4 with locations indicated on plate 1. The minimum 25-year period of record is used to evaluate long-term trends not dominated by variations in climate and localized pumping rates on water levels in a single well. A trend line using linear regression was calculated for the period from 1981 to 2005 to determine the slope in feet per year (ft/yr) for water levels in each well. The slope of the trend line represents the typical annual decline or rise in water level during the 25-year period. A statistical summary of the number of wells, the range of the annual rise or decline in water level for the county, the mean, and the median value for each county in Arkansas are listed in table 2. Negative values denote a decline in water level. Statistical hydrograph data were not compiled in table 2 by parish for Louisiana.

In Arkansas, during the period 1981-2005, the county mean annual water-level rose only in Columbia, Lafayette and Ouachita Counties. Mean annual declines were between 0.5 ft/yr and 0.0 ft/yr in Dallas, Grant, Phillips, and Woodruff Counties. Mean annual declines were between 1.0 ft/yr and 0.5 ft/yr in Calhoun, Cleveland, Craighead, Cross, Desha, Drew, Jefferson, Lee, and Union Counties. Mean annual declines were between 1.5 ft/yr and 1.0 ft/yr in Arkansas, Bradley, Lincoln, Lonoke, Poinsett, and Prairie Counties.

In Louisiana, declines in the Sparta-Memphis aquifer generally are shown at wells Cl-149 (hydrograph LB, fig. 4, plate 1), in Claiborne Parish, L-26 (hydrograph LD, fig. 4, plate 1), in Lincoln Parish, Un-26 (hydrograph LF, fig. 4, plate 1), in Union Parish, W-172 (hydrograph LH, fig. 4, plate 1), in Winn Parish, Ou-444 (hydrograph LE, fig. 4, plate 1) in Ouachita Parish, Ja-147 (hydrograph LC, fig. 4, plate 1), in Jackson Parish, and Bi-144 (hydrograph LA, fig. 4, plate 1) in Bienville Parish for the period of record from 1981-2005. The only exception is at well Cl-149, where the water level indicates an increase beginning in late 1999 and continues to the present. From 1981 to late 1999, Cl-149 indicates a declining water level at the rate of approximately 1.7 ft/yr and after 1999, an increase in water level at a rate of approximately 1.1 ft/yr. The rising water level in this well is likely a result of decreased industrial withdrawals in Union County, Arkansas.

Table 2. Statistical summary of annual rise-decline in water level by county for wells in the Sparta-Memphis aquifer in Arkansas, 1981-2005.

[Annual rise or decline in water level for each well is calculated using linear regression. Negative values represent a decline in water level]

County	Number of wells	Range or value of average rise/decline in water level (feet/year)	Mean annual rise/decline in water level (feet/year)	Median annual rise/decline in water level (feet/year)
Arkansas	23	-2.56 to -0.07	-1.21	-1.28
Bradley	3	-1.39 to -0.73	-1.06	-1.06
Calhoun	2	-0.95 to -0.62	-0.78	-0.78
Cleveland	4	-1.75 to -0.55	-0.97	-0.78
Columbia	10	-0.84 to +2.05	+0.14	-0.05
Craighead	2	-0.88 to - 0.73	-0.80	-0.80
Cross	4	-1.24 to -0.51	-0.89	-0.91
Dallas	5	-0.55 to +0.04	-0.26	-0.18
Desha	5	-1.57 to -0.66	-0.93	-0.84
Drew	5	-0.95 to -0.18	-0.61	-0.51
Grant	7	-1.39 to -0.11	-0.41	-0.20
Jefferson	14	-1.64 to -0.51	-0.98	-0.99
Lafayette	2	+0.04 to +0.26	+0.15	+0.15
Lee[1]	1	-0.55	-0.55	-0.55
Lincoln	5	-2.04 to -0.84	-1.37	-1.35
Lonoke[1]	1	-1.13	-1.13	-1.13
Ouachita	6	-0.07 to +0.91	+0.18	+0.02
Phillips	6	-0.69 to +0.66	-0.11	-0.27
Poinsett	2	-1.24 to -1.22	-1.23	-1.23
Prairie	8	-1.53 to -0.58	-1.15	-1.20
Union	27	-2.26 to -0.11	-0.97	-0.84
Woodruff[1]	1	0.00	0.00	0.00

[1]This county contained one well with a hydrograph of 25 years or more.

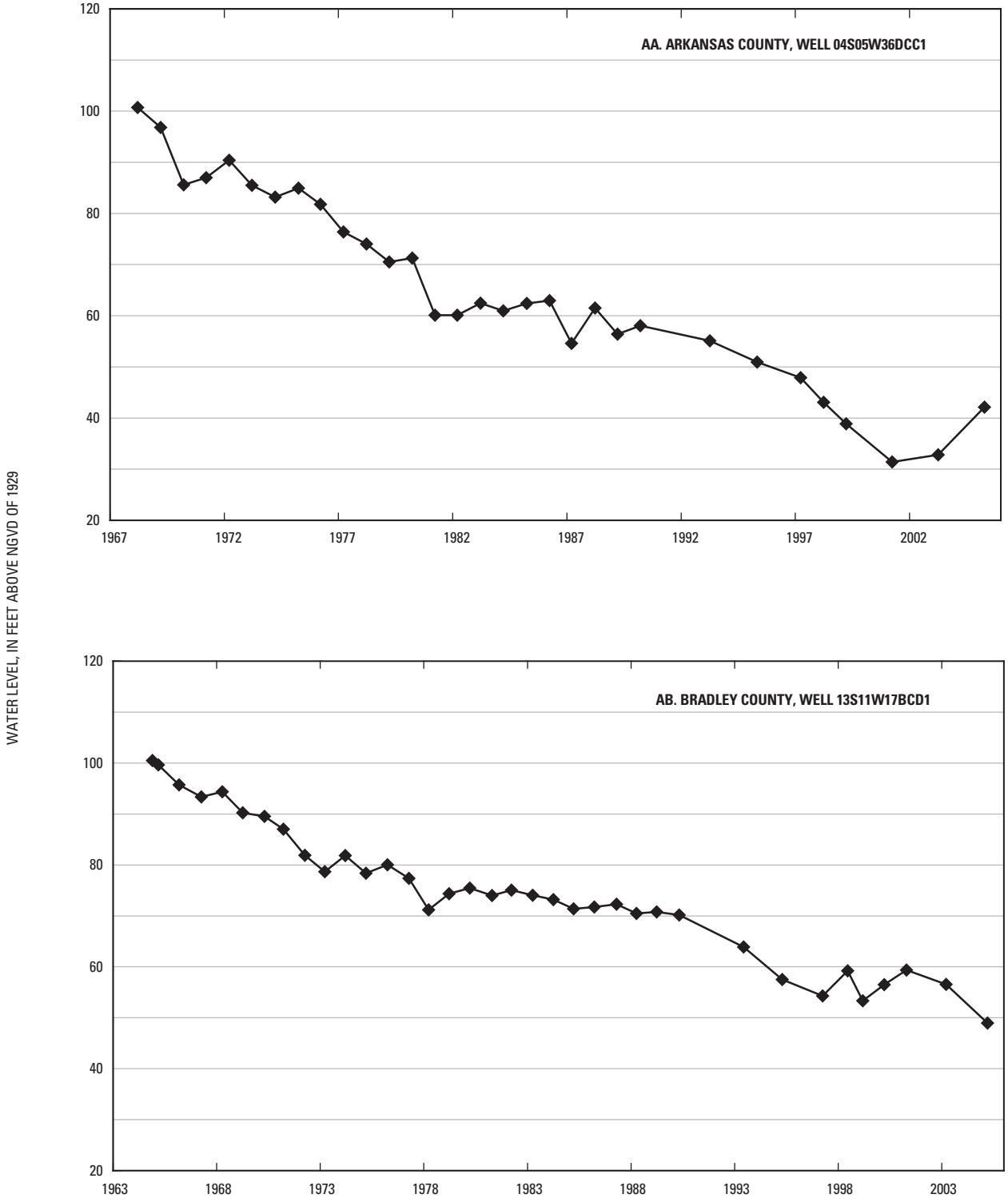

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.

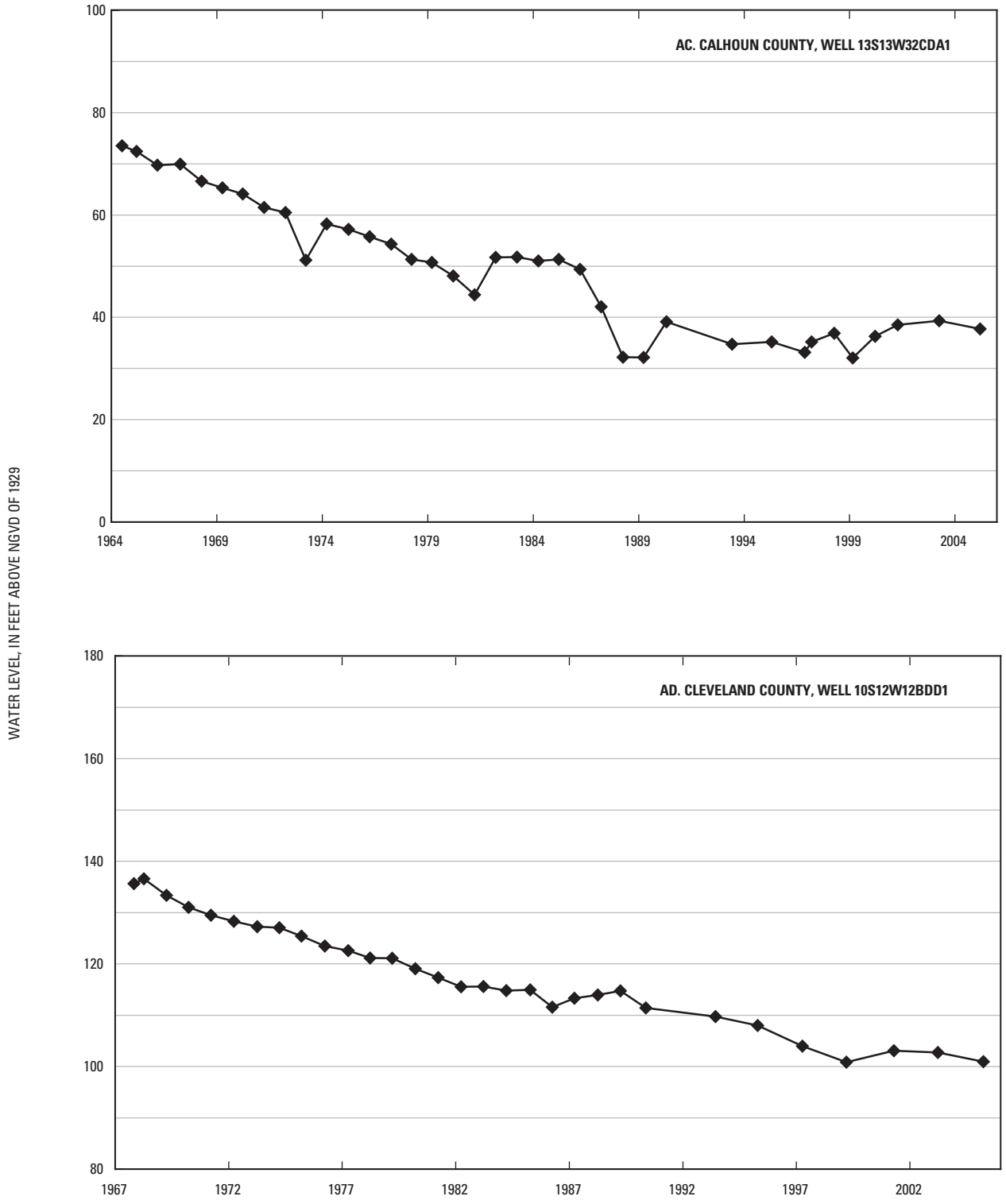

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

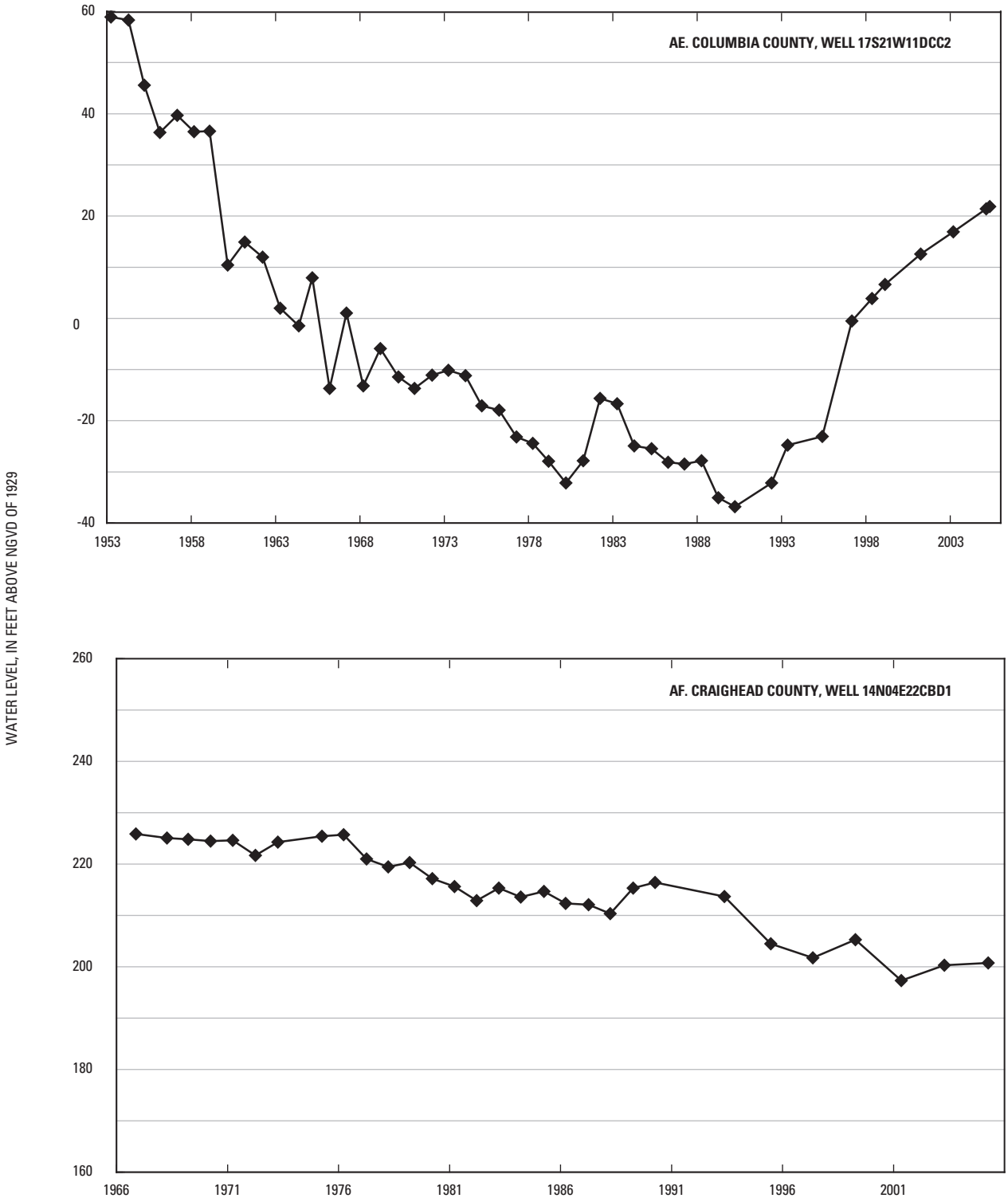

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

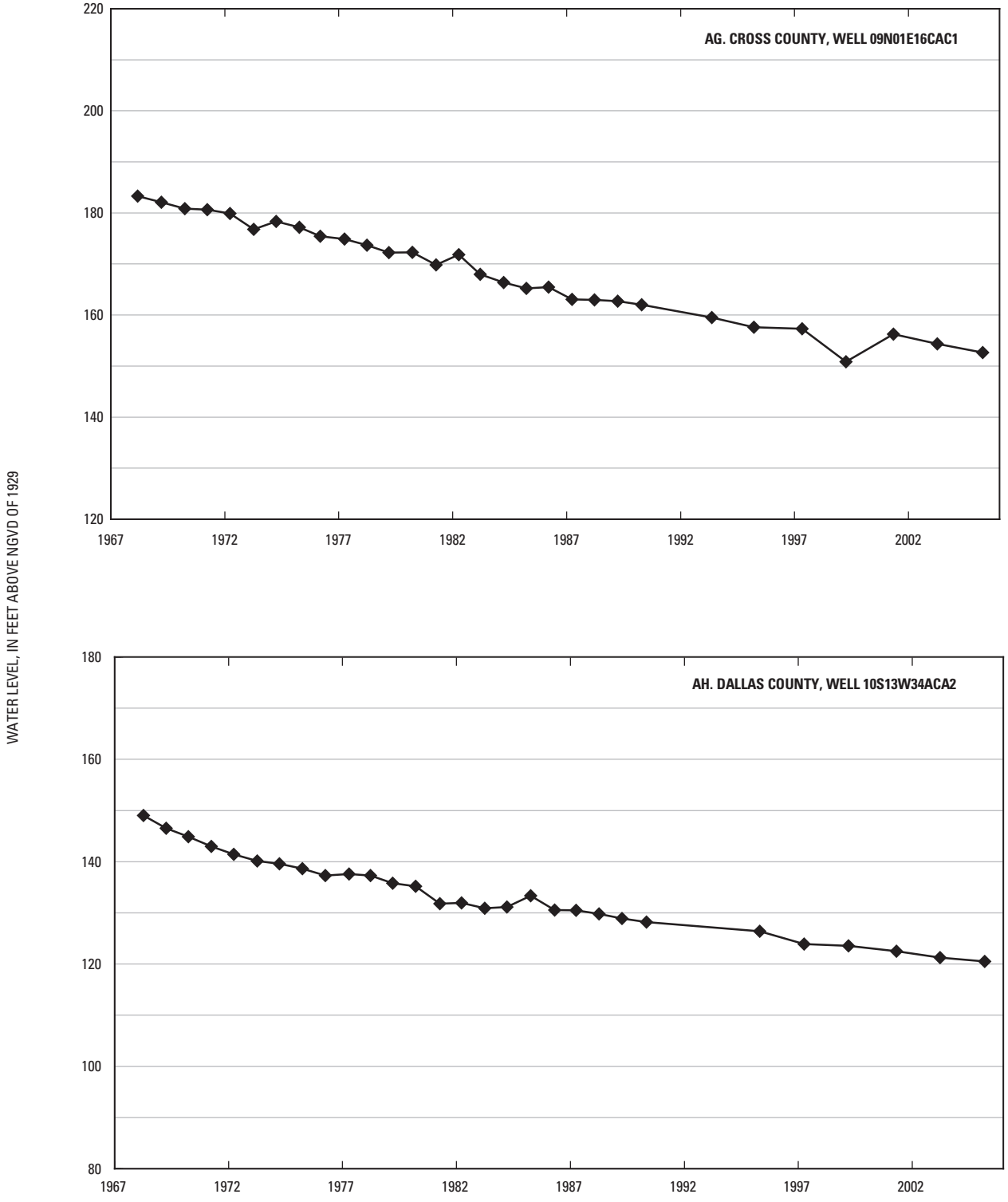

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

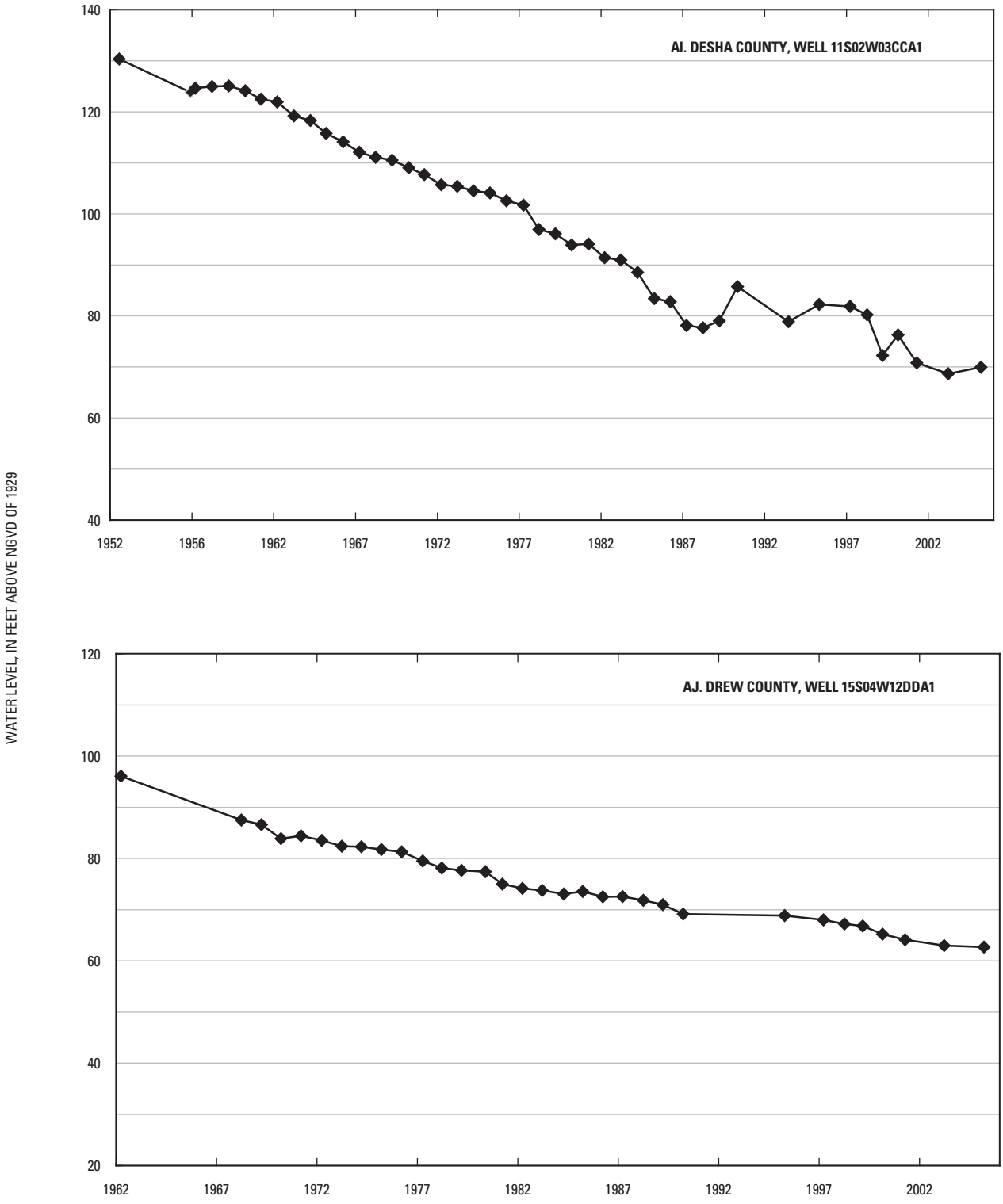

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

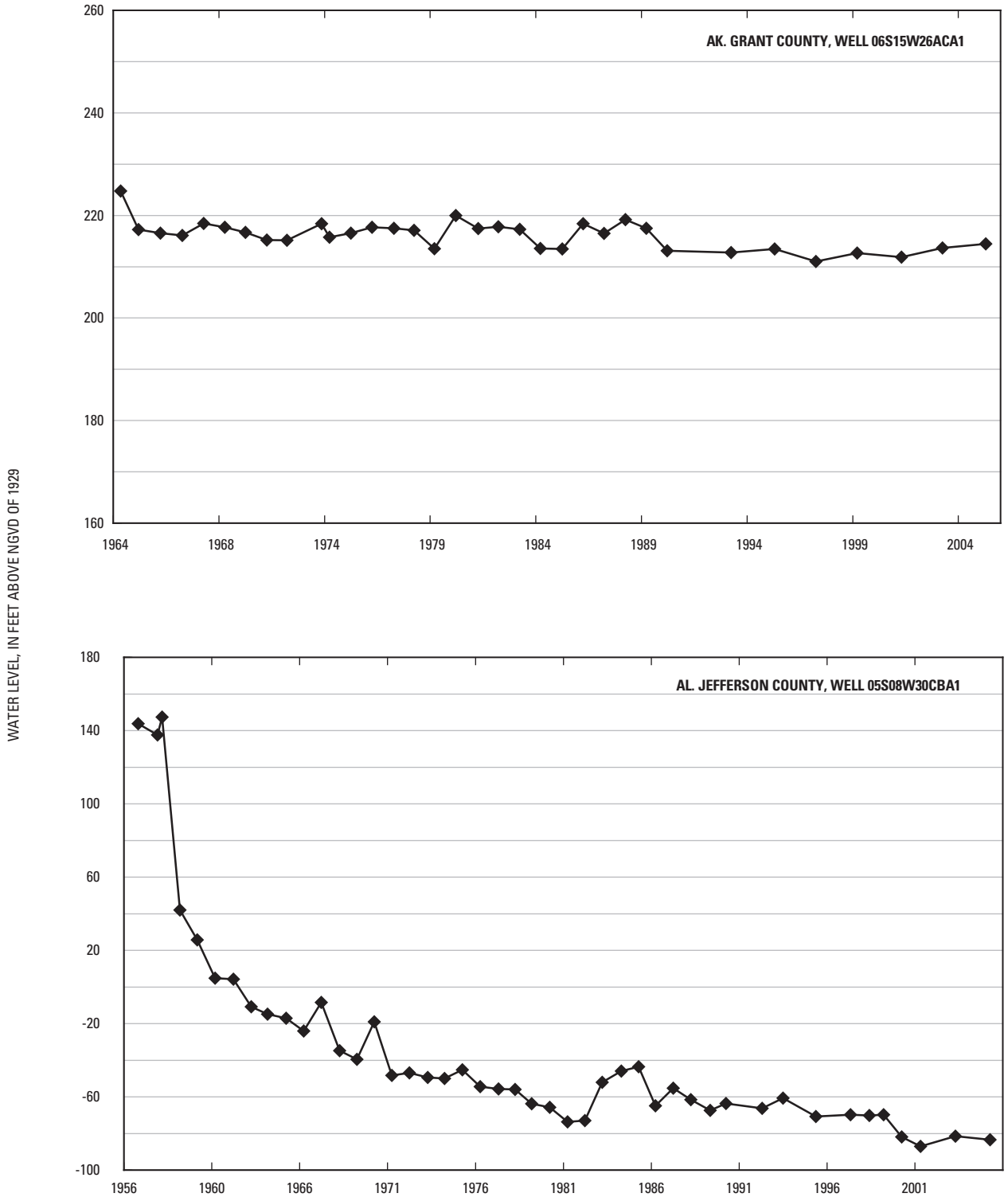

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

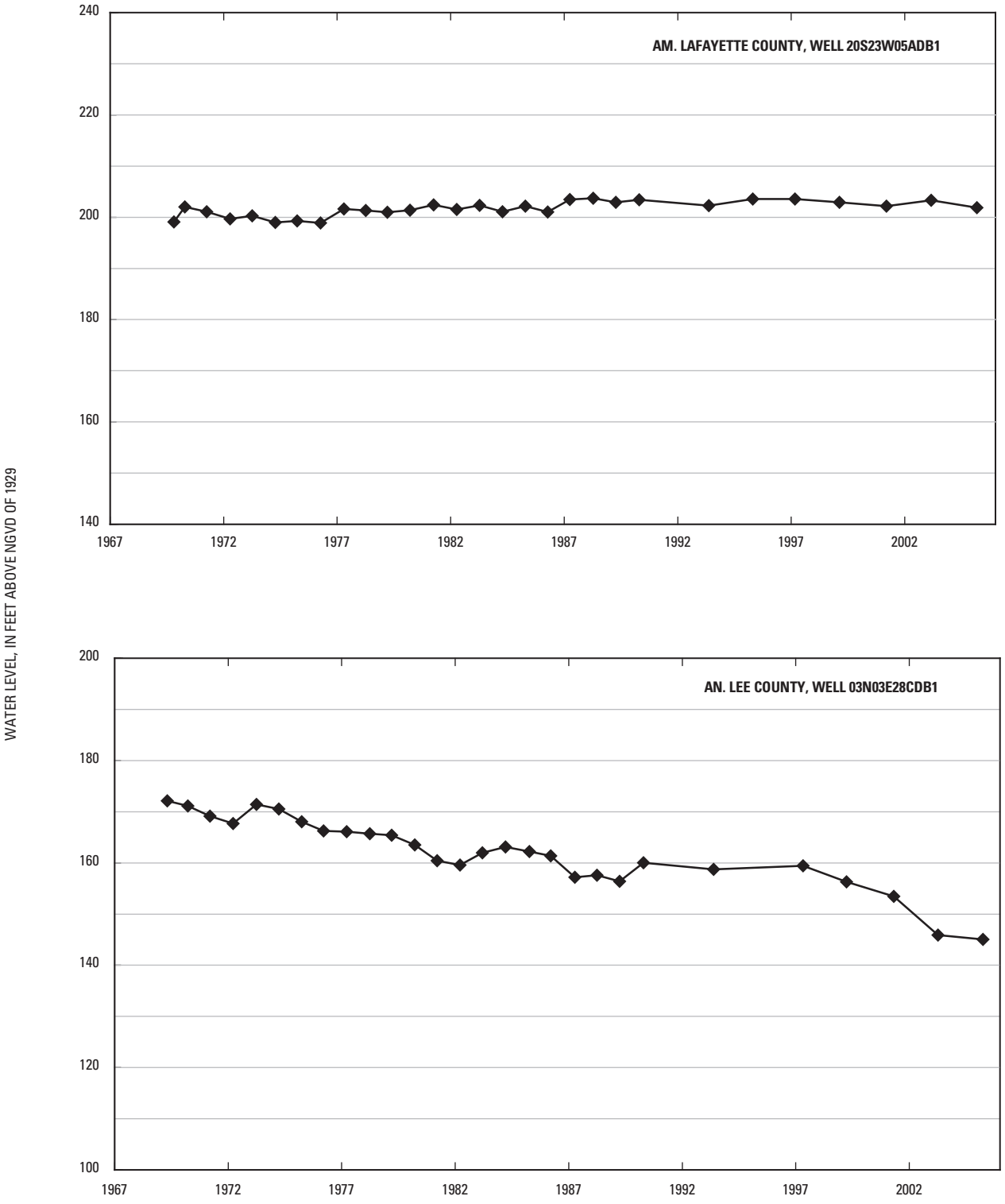

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

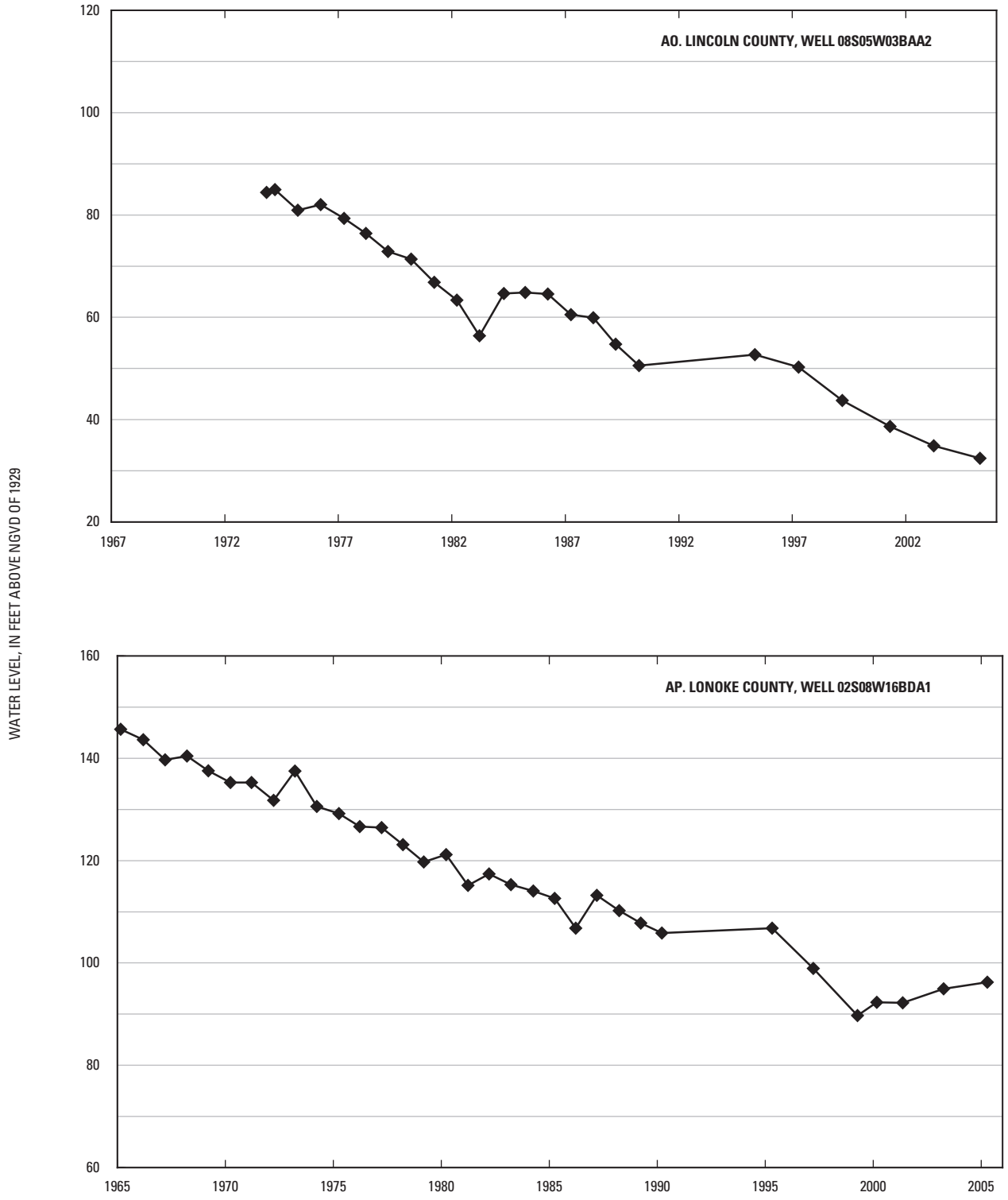

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

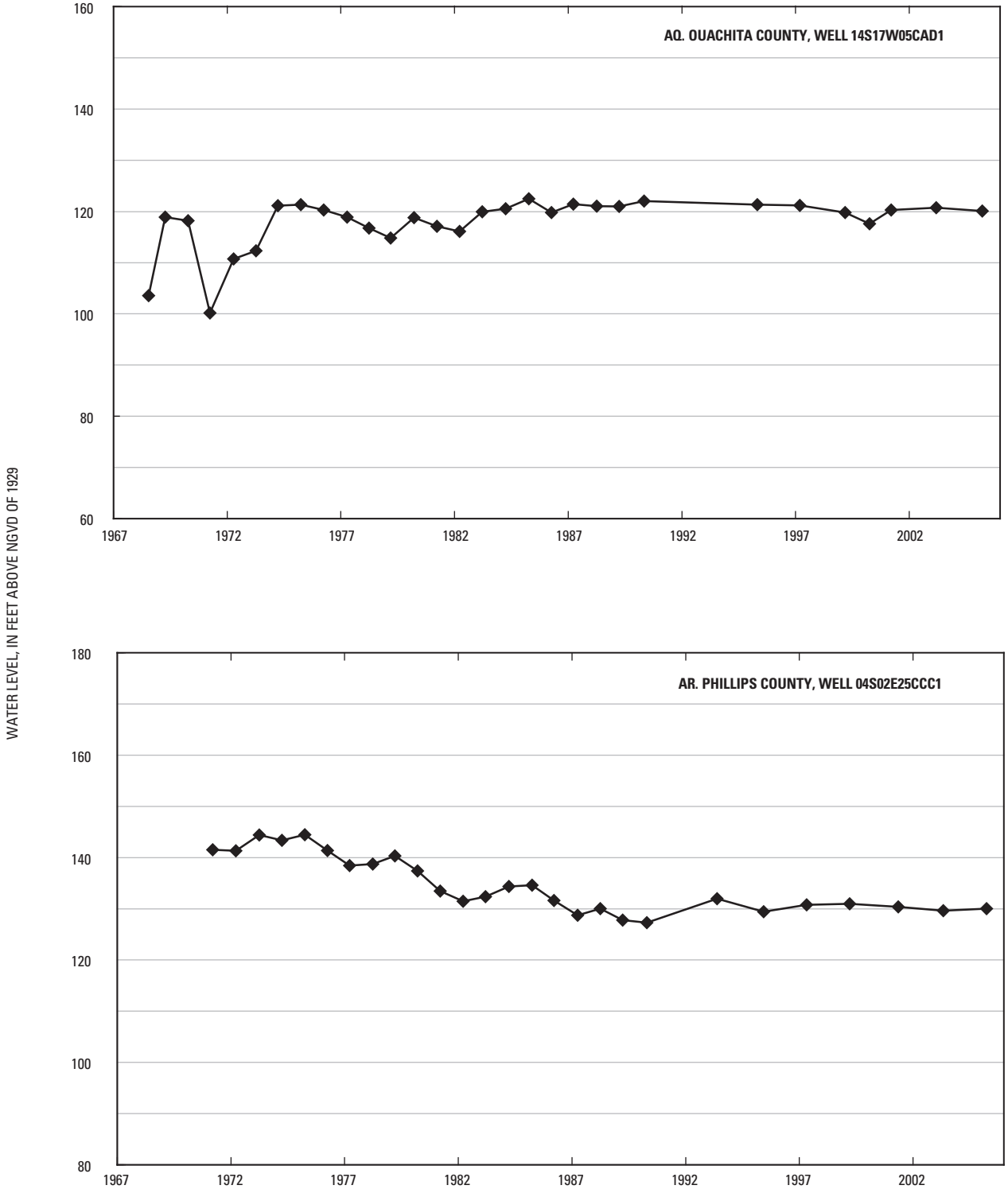

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

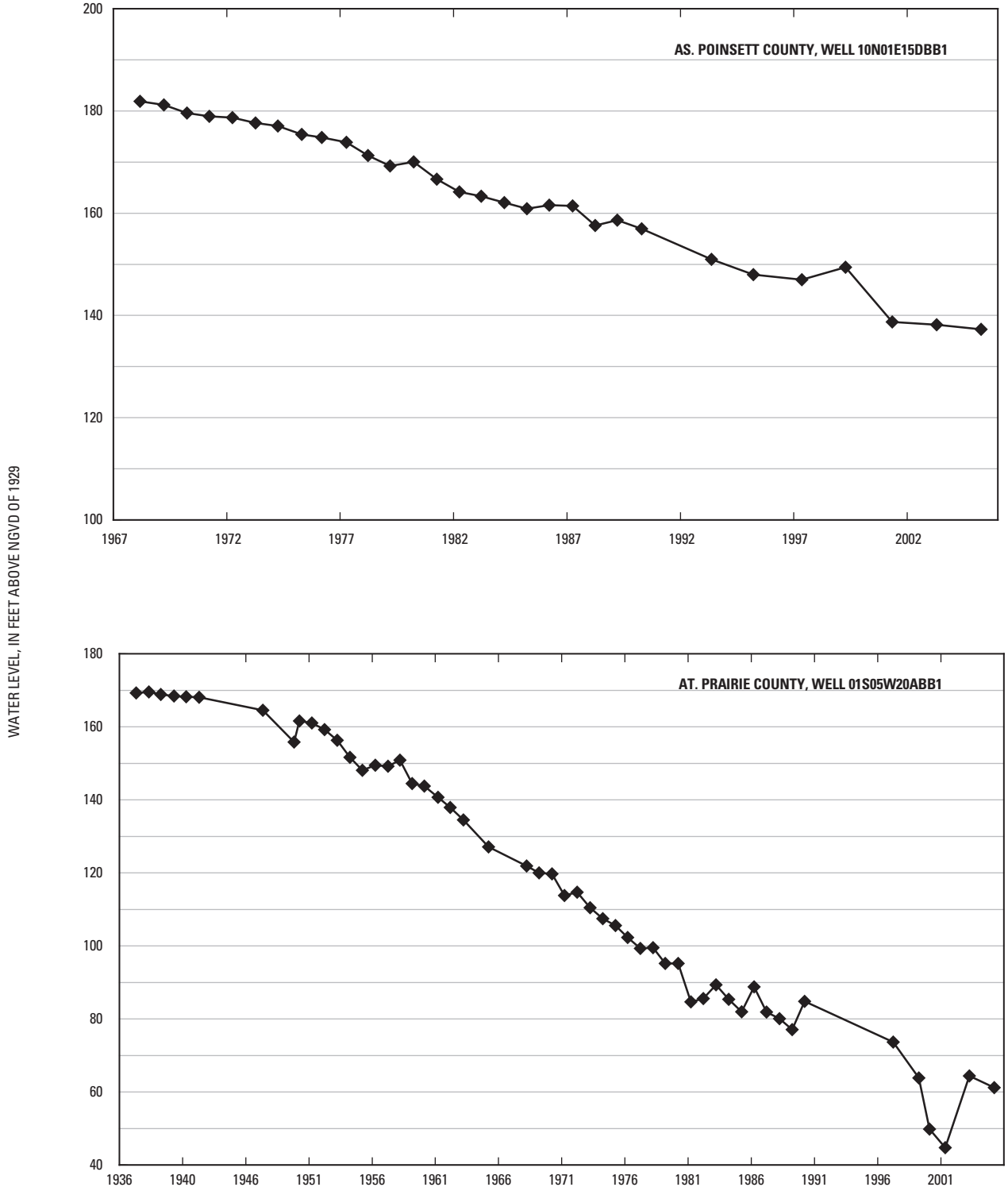

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

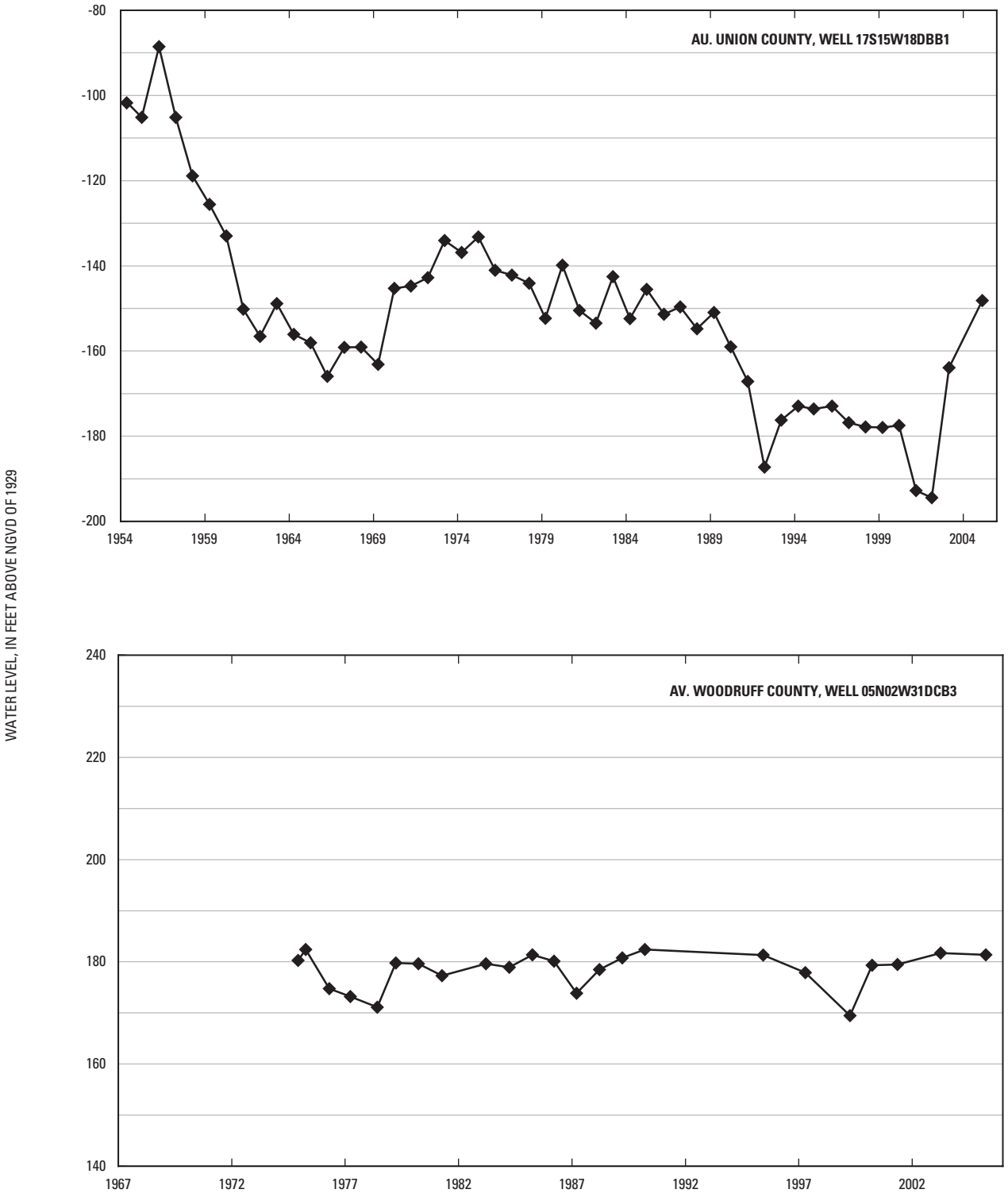

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

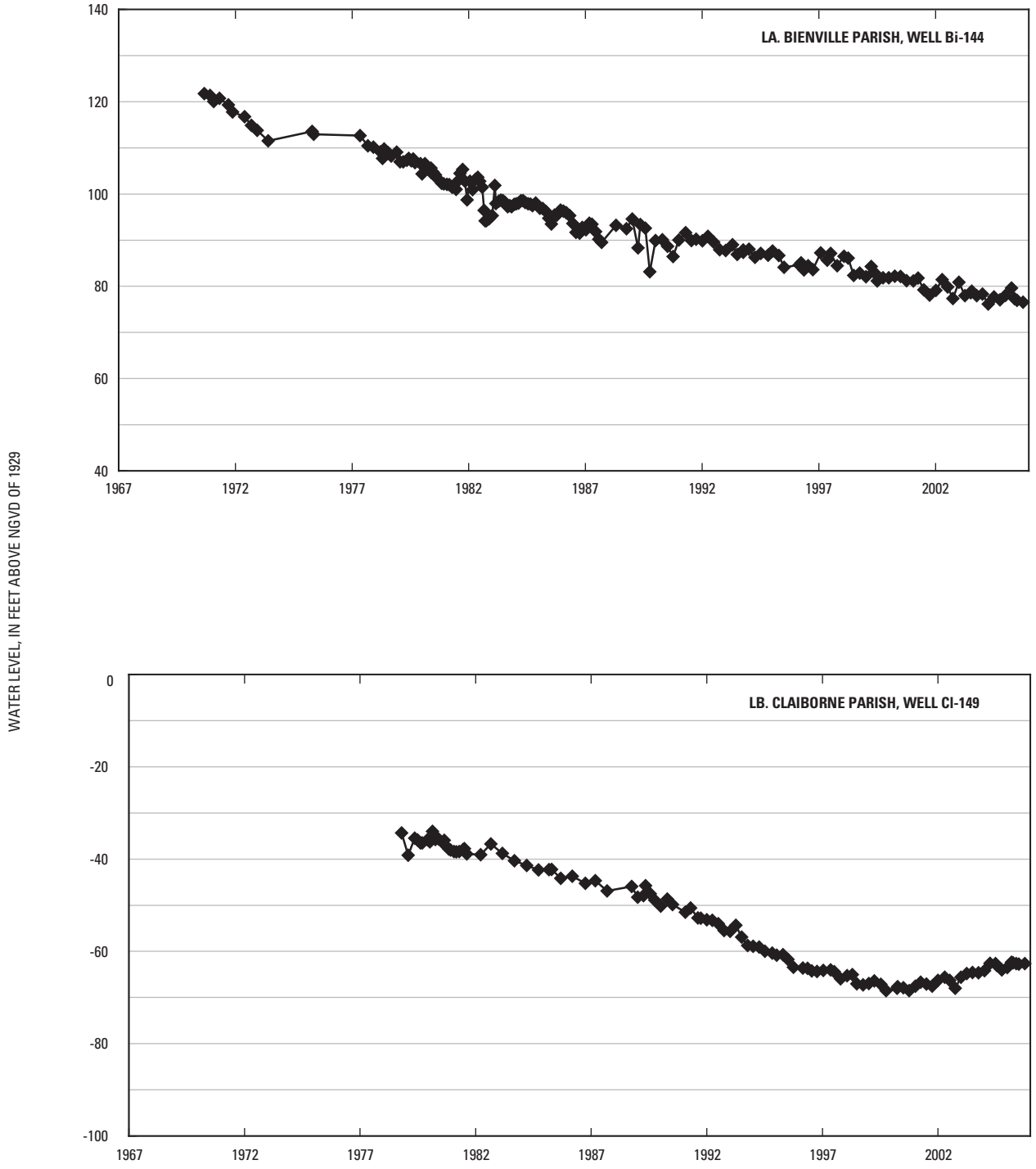

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

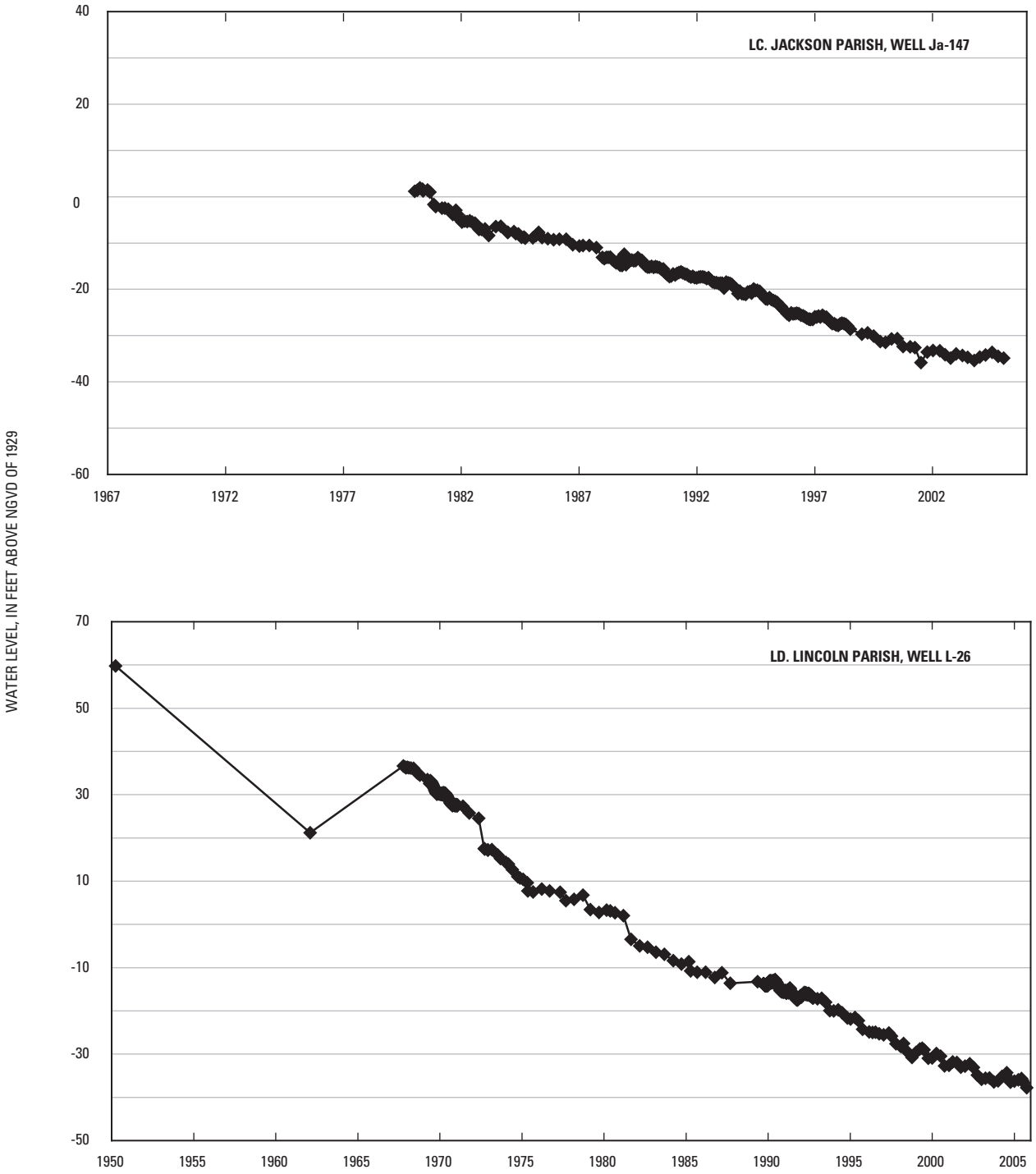

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

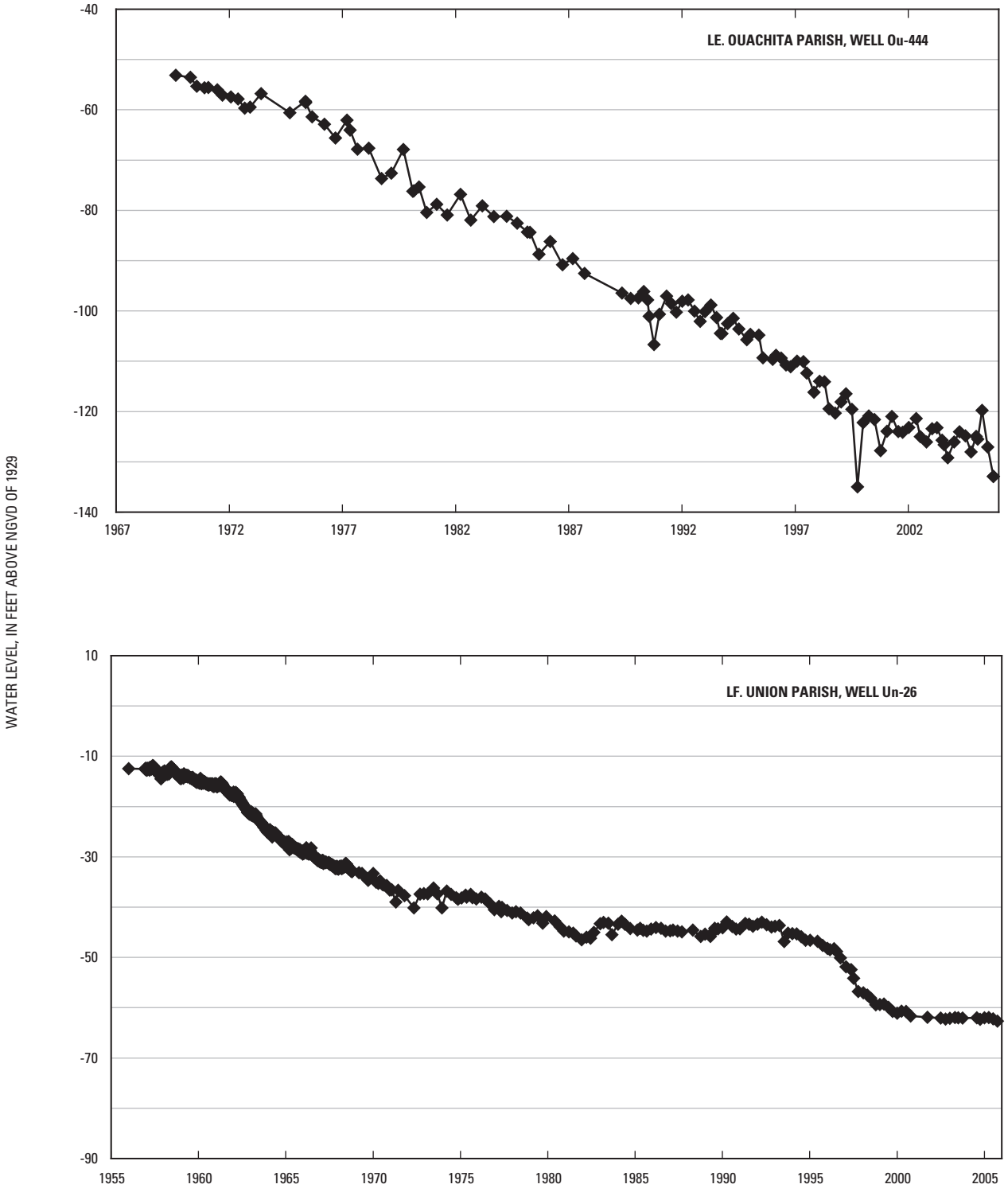

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

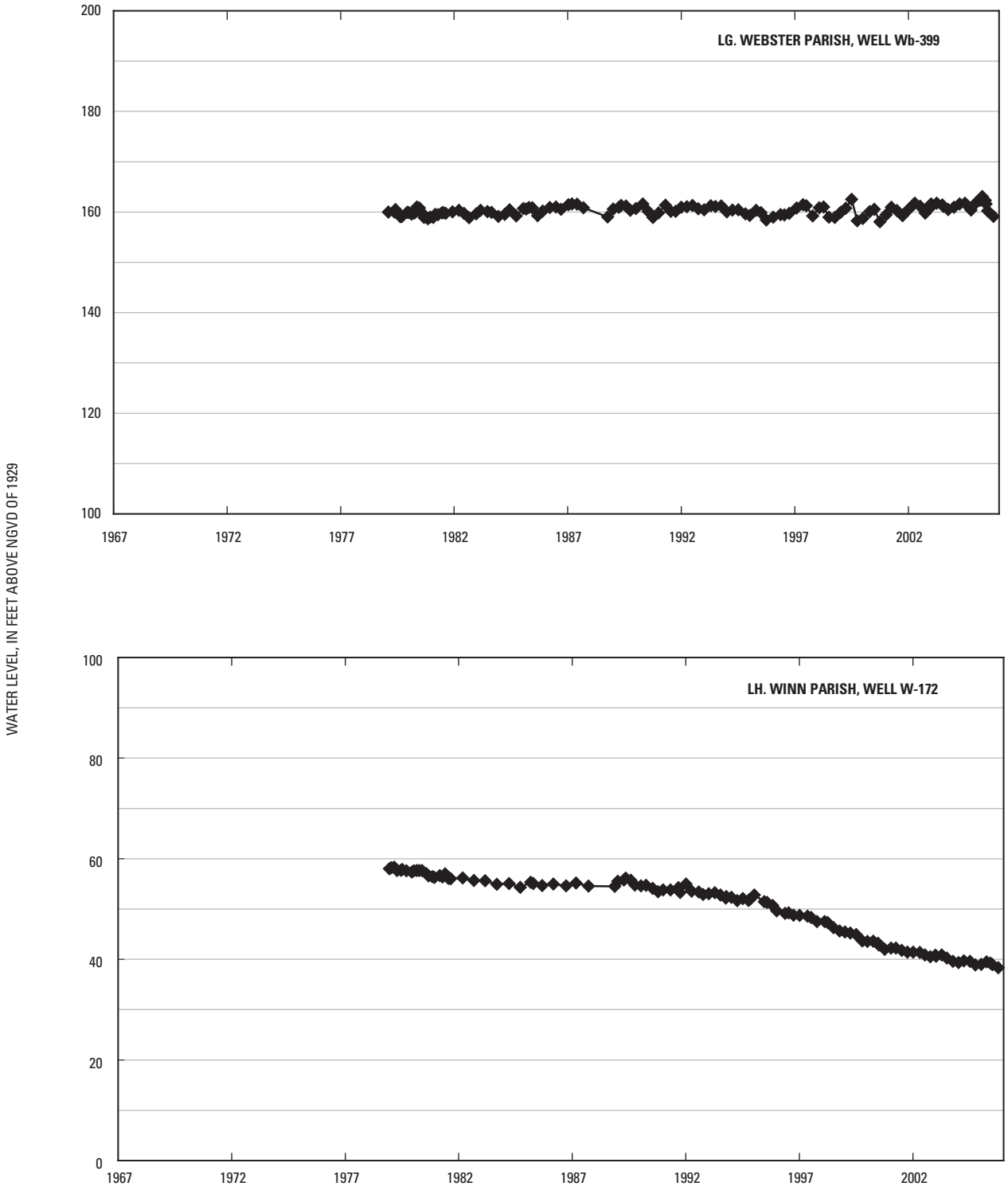

Figure 4. Water-level hydrographs for selected wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. Well location listed in appendix 1.—Continued

Water-Quality Conditions

Water samples were collected from 61 wells in the spring of 2005 and measured onsite for specific conductance and temperature in Arkansas (appendix 3). Wells were purged until the water temperature and specific conductance stabilized before samples were collected to ensure a representative sample.

Specific-conductance data indicate regionally diverse zones of mineralized water within the aquifers across the study area. Specific conductance ranged from 32.7 microsiemens per centimeter (µS/cm) in Ouachita County to about 1,356 µS/cm in Lee County. The median specific conductance was 278 µS/cm and the mean specific conductance was 362 µS/cm. Along the western border of the Sparta-Memphis aquifer in Arkansas near the outcrop area, specific conductance is low—generally less than 200 µS/cm, and increases to the east and south. This gradual increase of specific conductance continues south to the Louisiana State line.

Although there is a regional increase in specific conductance to the east and south, anomalous increases occur in some parts of the study area. Relatively high specific conductance values (greater than 700 µS/cm and less than 1,400 µS/cm) occur in Arkansas, Ashley, Lee, Monroe, Phillips, and Union Counties. Arkansas, Lee, Monroe, and Phillips Counties are adjacent in an area that has relatively high specific conductance values. Morris and Bush (1986) and Broom and others (1984) cited upward leakage of saltwater from the Nacatoch aquifer of Cretaceous age into the Sparta aquifer through a fault or abandoned oil and gas wells as possible explanations for these anomalies. Relatively high specific conductance values occur near the depression in Union County. This increase in specific conductance may be because of leakage of water with greater conductance from an underlying aquifer. A previous study documented several specific-conductance values greater than 2,000 µS/cm for ground water from the Sparta aquifer in Union County in 1984 (Broom and others, 1984).

The statistical distribution of specific-conductance values in 2005 has changed from the distribution of specific-conductance values in 2003. The distribution of specific conductance for 2005 and 2003 is shown in figure 5. The number of specific-conductance samples collected in 2005 and 2003 are 61 and 70, respectively. The samples collected in 2005 have a larger portion of samples in the 0-200 µS/cm range when compared to the 2003 distribution. The samples collected in 2003 have a larger portion of samples in the 401-600 µS/cm and 601-800 µS/cm ranges when compared to the 2005 distribution. More than half of the wells sampled in 2005 are different wells than those sampled in 2003. The difference in the geographical distribution of the wells sampled may account for the difference in distribution of specific-conductance values from 2005 and 2003.

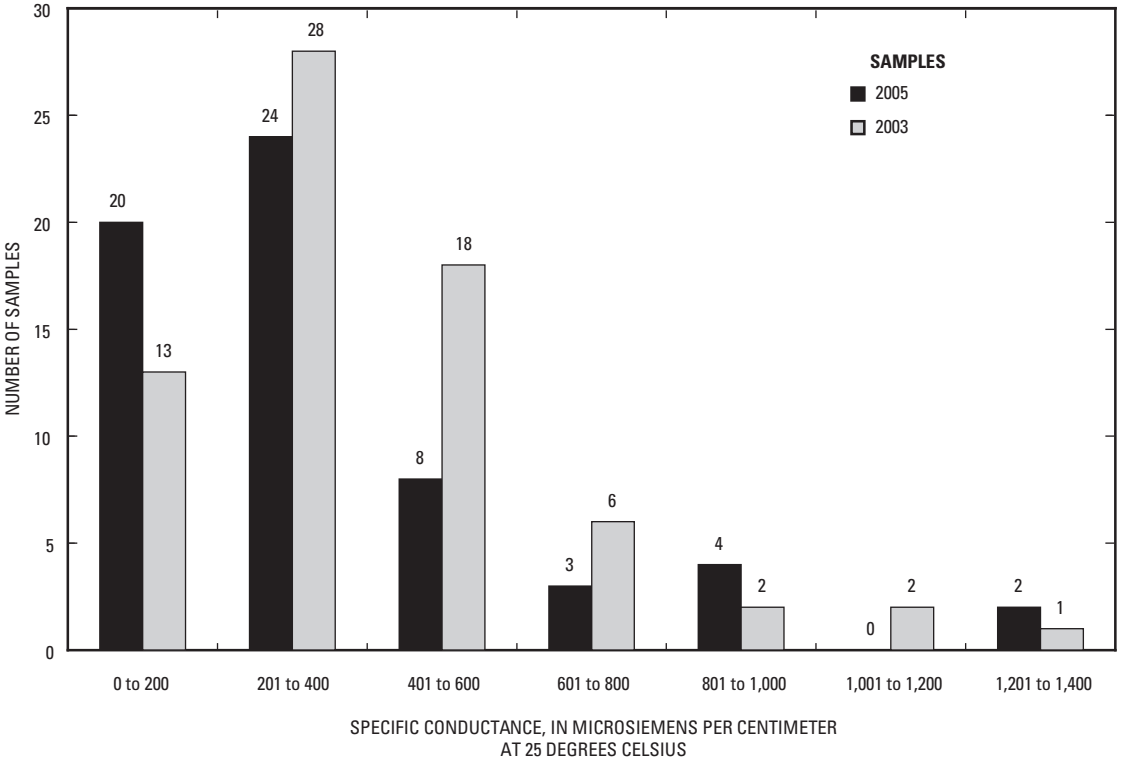

Figure 5. Distribution of specific conductance in samples from wells screened in the Sparta-Memphis aquifer in Arkansas, 2005 and 2003.

Summary

The U.S. Geological Survey in cooperation with the Arkansas Soil and Water Conservation Commission, the Arkansas Geological Commission, and the Louisiana Department of Transportation and Development has monitored water levels in the Sparta-Memphis aquifer since the 1920's. A combined report for Arkansas and Louisiana has been produced every 4 years since 1997 to describe ground-water levels in the aquifer and provide information for the management of this valuable resource. This report presents the status of water levels in the Sparta-Memphis aquifer in Arkansas and the Sparta aquifer in Louisiana and water-quality conditions in the Sparta-Memphis aquifer in Arkansas.

Total water use in the Sparta-Memphis aquifer in Arkansas and Louisiana generally increased from 1980 to 1995, then remained the same until 2000. In 1980, total water use in Arkansas and Louisiana was about 251 Mgal/d. In 1995 and 2000, total water use in Arkansas and Louisiana was about 355 Mgal/d, an increase of 29 percent over the 1980 total water use.

The 2005 potentiometric-surface map of the Sparta-Memphis aquifer shows the altitude to which water would have stood in tightly cased wells completed in the aquifers. The map is based upon water-level data collected in 333 wells in Arkansas and 121 wells in Louisiana, in the Sparta-Memphis aquifer during the spring of 2005. The highest water-level altitude measured in Arkansas was 327 ft above NGVD of 1929, located in Grant County in the outcrop at the western boundary of the study area; the lowest water-level altitude was 189 ft below NGVD of 1929 in Union County. The highest water-level altitude measured in Louisiana was 246 ft above NGVD of 1929, located in Bossier Parish in the outcrop area near the western boundary of the study area; the lowest water-level altitude was 226 ft below NGVD of 1929 in central Ouachita Parish.

Three large depressions are shown in Arkansas on the 2005 potentiometric-surface map, centered in Columbia, Jefferson, and Union Counties, as a result of large withdrawals for industrial and public supplies. The depression centered in Jefferson County deepened and expanded in recent years into Prairie County where withdrawals for agricultural, irrigation, and public supplies have increased. This depression has approximately the same shape and depth as on the 2003 potentiometric-surface map. The depressions in Columbia and Union Counties are elongated east to west because of large industrial withdrawals and coalesce at or near the Columbia and Union County line. The depression in Union County has receded from Union Parish, Louisiana. The depression in Columbia County is similar in shape and depth as on the 2003 potentiometric-surface map. A broad depression is shown in western Poinsett and Cross Counties in Arkansas.

In Louisiana, three major pumping centers are shown on the 2005 potentiometric map in Ouachita, Jackson, and Lincoln Parishes. Water withdrawals from these major pumping centers primarily is used for public- and industrial supply purposes. Withdrawals from Ouachita and Lincoln Parishes and Union County, Arkansas, primarily for industrial purposes, have caused the resulting cones of depression to coalesce so that the -40 ft potentiometric contour encircles the three pumping centers.

Seven smaller depressions are evident on the 2005 Sparta-Memphis aquifer potentiometric-surface map, located in Webster and Winn Parishes, Louisiana, and Calhoun, Cleveland, western Columbia, Desha, and Lafayette Counties, Arkansas. The depression in Calhoun County initially was shown on the 1996-1997 potentiometric surface. The depression in Desha County initially was shown on the 1999 potentiometric surface. The depressions in Webster and Winn Parishes were shown as early as 1975. The depressions in Cleveland, western Columbia, and Lafayette Counties initially were shown on the 2003 potentiometric surface.

A map of differences in water-level measurements between 2001 and 2005 was constructed using the difference between water-level measurements from 294 wells in Arkansas and 29 wells in Louisiana. The difference in water level between 2001 and 2005 ranged from -30.1 to 44.6 ft. The largest rise of 44.6 ft in water level measured was in Union County in Arkansas. The largest decline of 30.1 ft in water level measured was in Columbia County in Arkansas. Between 1999 and 2003, a large public supply converted from a primary source of ground water to a primary source of surface water. The decrease in withdrawals from the ground water resulted in the large rises in Columbia County. When public supply changed to surface water as the primary source, an industrial user decreased the amount of public-supplied water and increased self-supplied ground water. The increase in self-supplied ground water may have contributed to the largest decline in water level.

Areas with a general rise in water levels in Arkansas are shown in Arkansas, Columbia, Craighead, Jefferson, Prairie and the western half of Union Counties. The area around El Dorado had rises as much as 44.6 ft, with seven wells showing a rise of 20 ft or greater, which was an annual rise of 5 ft or greater. The rise in water level around El Dorado coincides with water conservation methods initiated in 1999 and the conversion of large industrial users to surface water from the Ouachita River in December 2004. Areas in Arkansas with a general decline in water level are shown in western Bradley, eastern Calhoun, Cleveland, Cross, Desha, Drew, Lafayette, Lee, Lincoln, Lonoke, Poinsett, and the eastern half of Union Counties.

In Louisiana, the water-level difference map showed a general rise in water levels in northern Claiborne, northern Webster, and northwestern Union Parishes mainly because of a decrease in industrial withdrawals in southern Arkansas, particularly Union County. Another rise in water level was indicated in western Jackson Parish where industrial with-

drawals have been reduced. The remainder of the study area in Louisiana showed a general decrease in water level ranging from 1.5 ft in Claiborne Parish at well Cl-116 to 6.1 ft in Union Parish at well Un-134.

In Arkansas, hydrographs were constructed for wells with a minimum of 25 years of water-level measurements. During the period 1981-2005, the county mean annual water level rose only in Columbia, Lafayette and Ouachita Counties. Mean annual declines were between 0.5 ft/yr and 0.0 ft/yr in Dallas, Grant, Phillips, and Woodruff Counties. Mean annual declines were between 1.0 ft/yr and 0.5 ft/yr in Calhoun, Cleveland, Craighead, Cross, Desha, Drew, Jefferson, Lee, and Union Counties. Mean annual declines were between 1.5 ft/yr and 1.0 ft/yr in Arkansas, Bradley, Lincoln, Lonoke, Poinsett, and Prairie Counties.

In Louisiana, hydrographs were constructed using a minimum of 25 years of water-level measurements. At well Cl-149 in Claiborne Parish, a decline in water level is evident from 1981 until late 1999 at a rate of approximately 1.7 ft/yr. Since 1999, a water-level increase of approximately 1.1 ft/yr is evident at Cl-149, because of a reduction of industrial withdrawals in Union County, Arkansas.

Water samples were collected from 61 wells in the spring of 2005 and measured onsite for specific conductance and temperature in Arkansas. Specific conductance ranged from 32.7 µS/cm in Ouachita County to about 1,356 µS/cm in Lee County. The median specific conductance was 278 µS/cm and the mean specific conductance was 362 µS/cm. Along the western border of the Sparta-Memphis aquifer in Arkansas near the outcrop area, ground water has low specific conductance—generally less than 200 µS/cm. Specific conductance increases to the east and south. Relatively high specific conductance values (greater than 700 µS/cm) occur near the water-level depression in Union County. This increase in specific conductance may be because of leakage of water with greater conductance from an underlying aquifer. Relatively high specific conductance values also occur in Arkansas, Ashley, Lee, Monroe, and Phillips Counties.

The statistical distribution of specific conductance values in 2005 has changed from the distribution of specific conductance values in 2003. The samples collected in 2005 have a larger portion of samples in the 0-200 µS/cm range when compared to the 2003 distribution. The samples collected in 2003 have a larger portion of samples in the 401-600 µS/cm and 601-800 µS/cm ranges when compared to the 2005 distribution.

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Appendixes 1-3

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana.

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
			State of Arkansas			
			Arkansas County			
02S04W06CDB1	343312	912849	57	154.52	212	4/19/2005
02S04W23DAA1	343044	912355	64	143.61	208	4/18/2005
02S04W33BBB1	342922	912703	55	149.96	205	4/18/2005
02S05W16CBB1	343144	913319	45	168.10	213	4/19/2005
02S05W27BBB1	343028	913230	52	164.26	216	4/18/2005
02S05W34BDA1	342925	913148	41	174.64	216	4/18/2005
02S05W35AAB1	342930	913035	45	171.05	216	4/18/2005
03S04W02CCB1	342748	912458	58	144.05	202	4/18/2005
03S04W26CDA1	342421	912438	65	137.79	203	4/18/2005
03S05W02AAB1	342842	913034	44	165.61	210	4/18/2005
03S05W13BDC1	342631	913005	38	171.74	210	4/18/2005
03S05W15CBB1	342633	913229	42	163.54	206	4/18/2005
03S05W18CAB1	342629	913525	40	156.28	196	4/14/2005
03S05W28DAB1	342447	913240	36	167.89	204	4/18/2005
03S06W30BBD1	342516	914216	30	161.27	191	4/14/2005
04S01W04CBD1	342225	910808	88	107.52	196	4/15/2005
04S04W11BCC1	342157	912502	47	151.06	198	4/19/2005
04S04W19CBB1	342004	912929	43	151.75	195	4/14/2005
04S04W22DAA1	342007	912515	39	155.51	195	4/19/2005
04S05W01BAA1	342322	912956	7	188.56	196	4/19/2005
04S05W05ACC1	342303	913413	35	151.05	186	4/14/2005
04S05W15AAA1	342132	913133	42	159.17	201	4/14/2005
04S05W36DCC1	341752	913004	42	153.85	196	4/14/2005
05S01W17BAA1	341551	910745	87	89.08	176	4/15/2005
05S03W04ADB1	341734	912007	31	156.52	188	4/14/2005
05S04W26ACA1	341358	912434	68	119.78	188	4/14/2005
05S05W36DAA1	341245	912947	46	133.87	180	4/14/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Arkansas County—Continued						
06S02W06ABB1	341228	911620	79	102.32	181	4/14/2005
06S02W17ADA1	341023	911453	83	104.83	188	4/14/2005
06S02W22CDB1	340904	911331	88	98.12	186	4/14/2005
06S03W27BAA1	340859	912009	68	112.51	181	4/14/2005
07S02W28ABA1	340340	911411	83	98.23	181	4/14/2005
07S03W06ABC1	340702	912248	62	122.84	185	4/14/2005
08S02W09BCC1	340031	911448	78	95.88	174	4/14/2005
Ashley County						
15S07W32CDD1	332118	915101	51	138.72	190	3/23/2005
17S09W15ACC1	331334	920116	82	17.97	100	3/23/2005
Bradley County						
12S09W31CCB1	333711	920444	45	186.36	231	3/23/2005
13S09W06ACA1	333648	920437	43	191.82	235	3/18/2005
13S09W06ACB2	333647	920417	41	166.75	208	3/18/2005
13S11W17BCD1	333454	921607	49	201.02	250	3/18/2005
16S12W21CAA1	331839	922052	26	74.26	100	3/18/2005
Calhoun County						
11S14W12CAC3	334630	922928	166	146.51	313	3/11/2005
13S13W32CDA1	333227	922742	38	170.27	208	3/17/2005
13S15W36CBD1	333227	923532	81	77.12	158	3/11/2005
14S13W05BBD1	333207	922802	33	156.36	189	3/17/2005
14S13W12CCB1	333040	922404	34	170.89	205	3/17/2005
14S15W16BAA1	333055	923912	50	96.29	146	3/11/2005
15S13W20BDC1	332411	922807	84	24.75	109	3/11/2005
Chicot County						
13S03W22DAD1	333312	912308	67	68.28	135	3/23/2005
Cleveland County						
08S12W13BDD1	340133	921638	114	145.06	259	3/29/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
			Cleveland County—Continued			
09S11W01DCA1	335729	921134	18	207.21	225	3/29/2005
09S11W01DDA2	335729	921120	57	208.35	265	3/29/2005
09S11W11CDB1	335623	921251	71	161.94	233	3/29/2005
10S09W23CDC1	334918	920021	57	162.56	220	3/29/2005
10S09W35ACD1	334758	915957	64	154.84	219	3/29/2005
10S12W12BDD1	335133	921743	101	119.04	220	3/29/2005
11S11W16AAB1	334543	921423	99	203.83	303	3/29/2005
			Columbia County			
15S20W20CCB1	332453	931215	156	216.13	372	3/09/2005
16S20W08DCC1	332114	931141	85	317.23	402	3/09/2005
16S20W18ACD1	332053	931237	75	262.50	337	3/09/2005
16S21W14CBB1	332049	931517	83	198.31	281	3/09/2005
16S21W20DAD1	331955	931736	102	248.24	350	3/09/2005
16S22W22CCD1	331948	932225	193	146.87	340	3/09/2005
17S19W15ABD1	331537	930329	52	272.87	325	3/09/2005
17S19W17ACA1	331538	930536	56	247.20	303	3/10/2005
17S19W18CBD1	331517	930656	36	269.07	305	3/10/2005
17S19W19BCA1	331433	930705	27	273.69	301	3/09/2005
17S19W30ABB1	331406	930650	26	221.74	248	3/09/2005
17S20W17CDA1	331520	931201	8	317.24	325	3/10/2005
17S20W36ABC1	331307	930755	39	296.42	335	3/10/2005
17S21W01BBC1	331743	931424	35	269.75	305	3/10/2005
17S21W08DCA1	331613	931758	89	210.87	300	3/09/2005
17S21W11DCC2	331609	931449	21	278.57	300	2/22/2005
17S21W11DCC3	331609	931449	18	280.37	298	3/10/2005
17S21W17BAB1	331608	931820	84	203.27	287	3/09/2005
17S22W21ABD1	331517	932304	213	81.62	295	3/09/2005
17S22W22ABB1	331522	932210	184	137.00	321	3/09/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Columbia County—Continued						
17S22W23BBB1	331521	932137	204	136.11	340	3/09/2005
18S20W08CBC1	331115	931227	-10	273.44	263	3/15/2005
18S20W10CAA1	331054	931016	12	277.51	290	3/15/2005
18S21W01ACC1	331223	931339	-5	299.63	295	3/10/2005
18S21W17ACD1	331034	931759	86	228.80	315	3/09/2005
18S22W27DDD1	330835	932159	178	133.64	312	3/09/2005
19S20W09CBD1	330555	931129	66	265.92	332	3/10/2005
19S21W16DBB1	330517	931724	111	173.24	284	3/09/2005
19S23W10ABD1	330644	932833	198	43.52	242	3/09/2005
19S23W11CDA2	330609	932744	196	52.45	248	3/09/2005
19S23W11DDB1	330605	932722	192	54.03	246	3/09/2005
19S23W14BAB2	330555	932752	194	50.46	244	3/09/2005
20S22W03DCC1	330138	932236	162	52.07	214	3/10/2005
20S22W11ACD1	330109	932133	164	107.13	271	3/10/2005
Craighead County						
13N03E23CDD1	354404	904433	161	87.15	248	4/06/2005
14N04E22CBD1	354929	903921	201	55.27	256	4/06/2005
14N04E28DBD1	354837	903953	194	60.31	254	4/06/2005
14N05E36CBC1	354751	903100	209	10.76	220	4/06/2005
15N03E31ADA1	355314	904807	214	55.90	270	4/06/2005
15N04E20ADB1	355506	904043	320	118.18	438	4/06/2005
15N05E29DBB1	355360	903433	237	21.08	258	4/06/2005
15N06E18ACA1	355544	902858	215	15.31	230	4/06/2005
Crittenden County						
05N08E11CCA2	350345	901300	188	22.94	211	4/05/2005
06N07E01DAD2	350958	901738	186	22.53	209	4/05/2005
06N09E08DCC1	350850	900922	207	8.10	215	4/05/2005
06N09E23AAB1	350745	900553	160	61.57	222	4/05/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Crittenden County—Continued						
07N09E14BAC1	351348	900628	190	27.42	217	4/05/2005
Cross County						
06N04E06ACA1	351004	904238	156	201.92	358	4/05/2005
07N05E04ADD1	351538	903330	173	36.08	209	4/05/2005
08N02E18BDB1	351908	905538	145	82.72	228	4/05/2005
09N01E16CAC1	352405	905951	153	81.37	234	4/05/2005
09N01E25AAD1	352244	905554	140	86.53	227	4/05/2005
09N03E22AAB2	352404	904518	150	126.92	277	4/05/2005
09N03E22AAD1	352403	904512	148	130.19	278	4/05/2005
09N04E30DCA1	352232	904218	164	265.67	429	4/05/2005
Dallas County						
07S14W30DCC1	340431	923360	215	119.65	335	3/07/2005
07S14W31AAA1	340425	923334	220	109.53	330	3/07/2005
07S16W20CAB1	340555	924545	297	24.97	322	3/07/2005
08S15W34BDC1	335859	923730	214	25.63	240	3/07/2005
08S16W18ACC1	340152	924639	236	16.03	252	3/07/2005
08S16W27DDD1	335937	924307	242	32.77	275	3/07/2005
09S13W35CCD1	335309	922413	129	71.36	200	3/07/2005
09S14W01BDC1	335754	922919	186	78.66	265	3/07/2005
09S16W19CAA1	335605	924701	254	6.03	260	3/07/2005
10S13W34ACA2	334829	922458	121	151.47	272	3/07/2005
10S14W27CDB1	334908	923138	238	31.93	270	3/07/2005
10S15W18BCC1	335120	924120	252	75.78	328	3/07/2005
Desha County						
09S02W26AAC1	335346	911521	84	68.91	153	3/24/2005
09S04W28DDD1	335310	913007	52	112.54	165	3/24/2005
10S02W26CCC2	334750	911624	77	71.24	148	3/24/2005
10S04W11CBC1	335034	912905	58	102.90	161	3/24/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
			Desha County—Continued			
11S02W03CCA1	334616	911711	70	69.02	139	3/24/2005
12S03W26CBB1	333749	912259	48	95.39	143	3/24/2005
12S03W34DAD1	333643	912305	70	77.50	147	3/24/2005
			Drew County			
11S04W02ACA2	334632	912827	60	93.47	153	3/23/2005
11S04W25CB2	334249	912707	62	85.87	148	3/23/2005
11S06W11DBC1	334607	914122	51	151.52	203	3/23/2005
12S06W30BBD1	333807	914543	47	223.83	271	3/23/2005
12S06W32DAD1	333649	914402	45	170.35	215	3/23/2005
13S05W36ACB1	333151	913408	79	90.31	169	3/23/2005
15S04W12DDA1	332429	912724	63	62.32	125	3/23/2005
			Grant County			
03S13W12AAA1	342846	922106	230	131.01	361	4/21/2005
03S15W26DAA1	342601	923447	327	9.87	337	4/21/2005
04S14W14CCC1	342201	922932	222	81.23	303	4/21/2005
05S13W03CAA1	341844	922400	178	82.09	260	4/20/2005
05S13W03CDA4	341838	922402	170	110.63	281	4/20/2005
05S13W07ADB1	341810	922650	211	59.43	270	4/20/2005
05S13W30AAA1	341550	922650	210	120.09	330	4/20/2005
05S14W06DCC1	341843	923327	207	86.47	293	4/21/2005
05S15W05ABD1	341924	923827	219	16.97	236	4/21/2005
06S11W05ACD1	341341	921413	59	209.74	269	4/21/2005
06S15W26ACA1	341022	923538	214	65.53	280	4/20/2005
07S12W21BDB1	340558	921953	221	2.12	223	4/21/2005
			Jefferson County			
03S08W19BAD1	342624	915444	46	171.47	217	4/12/2005
03S08W19BBD1	342628	915505	48	166.74	215	4/12/2005
03S08W19BDB1	342619	915455	47	168.38	215	4/12/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Jefferson County—Continued						
03S09W23BBD1	342627	915713	59	165.45	224	4/12/2005
03S10W14CAD1	342659	920330	107	113.80	221	4/12/2005
03S10W27AAD1	342502	920434	96	126.25	222	4/12/2005
03S11W22ABC1	342651	921058	135	174.99	310	4/13/2005
04S07W17BCC1	342140	914742	32	168.40	200	4/12/2005
04S08W35BBD1	341909	915056	-8	207.50	200	4/12/2005
04S09W11BAA1	342309	915702	74	135.51	210	4/12/2005
04S10W17BDA1	342212	920646	73	191.72	265	4/13/2005
04S10W29ADB1	342025	920625	60	207.96	268	4/13/2005
04S11W14BAD1	342220	921000	90	309.76	400	4/13/2005
05S08W30ADB1	341452	915440	-76	297.47	221	4/12/2005
05S08W30CBA1	341446	915527	-83	290.93	207	4/13/2005
05S09W19BAA3	341609	920131	-32	257.64	226	4/12/2005
05S09W24DBD1	341530	915556	-69	277.12	208	4/13/2005
05S09W31DDC1	341337	920109	-50	276.94	227	4/13/2005
05S09W35AAB1	341420	915653	-46	250.58	205	4/13/2005
05S10W11ACA1	341741	920322	64	171.02	235	4/13/2005
05S10W16BAD1	341700	920549	35	241.67	277	4/13/2005
05S10W16DBB1	341635	920543	21	294.23	315	4/12/2005
05S10W16DBD1	341635	920534	18	283.89	302	4/12/2005
06S08W16CCC1	341143	915517	-53	255.74	202	4/13/2005
06S08W25ADC1	341025	915116	-22	225.65	203	4/13/2005
06S09W17CAD1	341159	920207	-25	258.15	233	4/13/2005
06S09W17CCA1	341152	920221	-34	267.95	234	4/13/2005
06S10W23ACA2	341123	920504	11	223.68	235	4/12/2005
06S10W23ACD1	341116	920508	15	223.97	239	4/12/2005
06S10W23DBA1	341105	920506	15	237.29	252	4/12/2005
07S07W24BAB1	340633	914523	23	164.84	188	4/13/2005
07S10W24CAC1	340549	920421	6	305.17	311	4/13/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
			Lafayette County			
16S23W12CAD1	332143	932609	247	74.85	322	3/08/2005
16S24W26AAC1	331950	933303	212	54.65	267	3/08/2005
17S23W19ACC1	331520	933128	239	51.57	291	3/08/2005
17S24W23BBD1	331526	933403	229	31.87	261	3/08/2005
18S23W29ACC1	330911	933039	243	12.23	255	3/08/2005
19S23W29BDB1	330352	933103	208	41.56	250	3/08/2005
19S25W13CAB1	330555	933922	217	38.50	255	3/08/2005
20S23W05ADA1	330223	933026	207	34.86	242	3/08/2005
20S23W05ADB1	330223	933036	202	40.15	242	3/08/2005
			Lee County			
01N04E09CDD1	344210	904119	148	59.65	208	4/04/2005
02N01E10CAD1	344743	905925	149	51.88	201	4/04/2005
03N03E28CDB1	345006	904749	145	61.97	207	4/04/2005
			Lincoln County			
07S07W30CDC1	340444	915043	28	180.38	208	4/11/2005
08S04W22AAA1	340105	912753	47	119.87	167	4/11/2005
08S05W03BAA2	340310	913454	32	147.58	180	4/11/2005
08S05W35ACC1	335907	913337	26	139.97	166	4/11/2005
08S06W31DCC1	335850	914358	48	132.63	181	4/11/2005
08S08W35DBB1	335858	915222	48	201.98	250	4/11/2005
08S08W35DCB1	335851	915217	59	210.54	270	4/11/2005
09S07W07DAD1	335634	915128	27	268.54	296	4/11/2005
			Lonoke County			
01N07W03BCC1	344425	914503	95	127.91	223	4/19/2005
01S08W02DBD1	343855	914960	113	97.32	210	4/20/2005
02N07W06ACD1	344939	914737	120	121.48	241	4/19/2005
02N07W09AAA1	344906	914500	133	98.77	232	4/19/2005
02N07W22DBA1	344651	914426	99	128.45	227	4/19/2005
02N07W24DAC1	344650	914209	84	146.54	231	4/19/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Lonoke County—Continued						
02N07W32DDD1	344453	914619	97	129.33	226	4/19/2005
02S07W08DCC1	343235	914700	62	140.15	202	4/20/2005
02S08W16BDA1	343228	915232	96	119.77	216	4/20/2005
02S09W15BBB2	343247	915825	155	71.35	226	4/20/2005
03N07W03CAA1	345445	914426	157	78.28	235	4/19/2005
03N07W23CCC1	345144	914350	143	85.33	228	4/19/2005
03N08W11ACD1	345403	914935	156	91.62	248	5/05/2005
03N08W22DAD1	345205	915024	140	92.69	233	5/05/2005
03N08W22DAD2	345205	915024	136	96.57	233	5/05/2005
03N08W22DDD2	345152	915025	139	96.24	235	5/05/2005
Mississippi County						
11N09E26AAD3	353302	900523	221	19.06	240	4/05/2005
11N09E26ABA2	353304	900539	221	15.34	236	4/05/2005
Monroe County						
01N03W14CCB1	344144	911801	99	72.73	172	3/31/2005
03N01W33CDD1	345446	910635	142	68.01	210	3/31/2005
03N02W26DAB1	345042	911026	145	47.13	192	3/31/2005
04N02W28DDD4	345535	911221	162	30.49	192	3/31/2005
04N02W30BAC1	345617	911504	167	14.59	182	3/31/2005
04N02W30BAD1	345617	911515	166	9.86	176	3/31/2005
Nevada County						
14S21W04CCB1	333251	931708	302	58.44	360	3/08/2005
Ouachita County						
11S15W27ABD1	334441	923726	128	71.72	200	3/17/2005
11S17W14CAC1	334631	924927	127	18.70	146	3/17/2005
11S17W36CCA1	334341	924834	126	7.18	133	3/17/2005
11S18W20AAA1	334614	925759	257	44.10	301	3/17/2005
12S15W09BBA1	334223	923922	142	70.57	213	3/17/2005
12S16W25BDC1	333929	924211	106	33.82	140	3/17/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Ouachita County—Continued						
12S16W26ABD1	333946	924304	102	34.69	137	3/17/2005
12S18W19CDC1	334014	925951	227	8.00	235	3/17/2005
12S18W25CAB1	333937	925442	110	77.43	187	3/17/2005
12S19W09BAB1	334251	930352	280	10.01	290	3/17/2005
12S19W14AAA1	334143	930105	232	5.03	237	3/17/2005
12S19W35BDD1	333901	930146	194	156.23	350	3/17/2005
13S16W28ADD1	333416	924451	74	32.19	106	3/22/2005
13S18W31BDD1	333343	925956	172	70.02	242	3/22/2005
13S19W28BCD1	333434	930418	194	36.22	230	3/22/2005
14S17W05CAD1	333238	925255	120	36.93	157	3/22/2005
14S17W32CAD1	332803	925251	138	81.86	220	3/22/2005
14S19W29ABB1	332941	930513	192	87.52	280	3/22/2005
15S15W32DBB1	332232	924027	-56	176.39	120	3/23/2005
15S18W36ADD1	332311	925436	65	95.43	160	3/22/2005
15S19W10DCC1	332618	930318	137	73.25	210	3/23/2005
15S19W21CDD2	332438	930432	74	198.38	272	3/23/2005
Phillips County						
01S02E32DDC1	343324	905455	130	80.79	211	3/31/2005
02S02E01ADC1	343323	905056	139	36.62	176	3/31/2005
02S04E02DBA1	343243	903907	137	112.84	250	3/31/2005
02S05E16BCB1	343108	903526	156	33.52	190	3/31/2005
02S05E29CCC1	342851	903635	144	34.96	179	3/31/2005
03S03E30DAA1	342403	904915	128	43.88	172	3/31/2005
03S05E05BAB1	342755	903621	124	55.54	180	3/31/2005
04S02E25CCC1	341824	905121	130	35.99	166	3/31/2005
Poinsett County						
10N01E12BDC1	353026	905630	139	95.10	234	4/06/2005
10N01E15DBB1	352931	905825	137	94.74	232	4/06/2005
10N01E33ABA1	352725	905924	146	75.44	221	4/06/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Poinsett County—Continued						
10N03E02BCD1	353139	904447	141	109.89	251	4/06/2005
10N03E23CAC1	352850	904432	146	111.69	258	4/06/2005
11N02E16CCC1	353448	905321	138	105.49	243	4/06/2005
11N03E25BDD1	353325	904323	148	120.71	269	4/06/2005
12N03E12BBB1	354137	904340	149	96.67	246	4/06/2005
12N03E35BCC1	353745	904456	142	102.24	244	4/06/2005
12N03E35DDA1	353727	904353	146	101.36	247	4/06/2005
Prairie County						
01N05W19CDC1	344113	913505	73	139.47	212	3/30/2005
01N06W02ABB1	344442	913701	105	115.65	221	3/30/2005
01N06W34CBB1	343943	913846	70	155.79	226	3/30/2005
01S05W06BCB1	343904	913532	71	148.65	220	3/30/2005
01S05W20ABB1	343640	913352	61	158.85	220	3/30/2005
01S06W01BDD2	343859	913613	62	163.98	226	3/30/2005
01S06W11DBD1	343749	913654	61	164.72	226	3/30/2005
02N04W19ACB1	344649	912802	120	91.13	211	3/31/2005
02N06W19AAB1	344718	914050	98	138.21	236	3/30/2005
02N06W20BCB1	344707	914033	94	142.00	236	3/30/2005
02N06W21DAD1	344644	913829	112	119.87	232	3/30/2005
02N06W22BDD1	344654	913801	114	118.96	233	3/30/2005
03N05W03ADA2	345452	913043	145	60.03	205	3/31/2005
03N05W20CCC1	345145	913356	143	70.41	213	3/31/2005
03N06W20CDD1	345140	914004	141	83.79	225	3/30/2005
St. Francis County						
04N04E18BAB1	345743	904319	157	63.28	220	4/04/2005
Union County						
16S14W15CAB1	331944	923218	-67	160.88	94	3/15/2005
16S15W20DAA1	331860	923958	-98	288.32	190	3/15/2005
16S15W31ACC1	331717	924129	-126	294.15	168	3/15/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
			Union County—Continued			
16S16W02ABC1	332206	924329	-52	168.36	116	2/23/2005
16S18W34ABC2	331806	925709	46	205.26	251	3/15/2005
17S12W31DDD1	331206	922226	-18	238.11	220	3/16/2005
17S12W32BBC1	331202	922219	-20	250.58	231	3/16/2005
17S13W31BAC1	331200	922916	-90	306.13	216	3/16/2005
17S14W22BAB1	331354	923224	-116	317.24	201	2/22/2005
17S15W08CDD1	331505	924027	-151	325.58	175	3/16/2005
17S15W18DBB1	331439	924129	-148	331.10	183	2/22/2005
17S15W28DBA1	331246	923910	-161	390.80	230	3/14/2005
17S15W28DCC1	331233	923924	-152	437.19	285	3/17/2005
17S15W29CDC1	331229	924039	-153	373.46	220	3/17/2005
17S15W31DCA1	331145	924117	-153	425.27	272	3/16/2005
17S15W31DDA1	331144	924105	-154	414.99	261	3/14/2005
17S16W01BAA1	331649	924233	-120	308.53	189	3/16/2005
17S16W02CCC1	331559	924403	-154	336.32	182	3/16/2005
17S16W02DCD1	331602	924326	-166	387.68	222	3/16/2005
17S16W12CDD1	331506	924232	-185	406.31	222	3/16/2005
17S16W24BDB1	331357	924248	-189	394.04	205	3/17/2005
17S17W25DBA2	331256	924838	-109	359.00	250	2/22/2005
17S17W30DCD1	331257	925356	-42	321.93	280	3/15/2005
18S11W09ABC1	331012	921443	38	97.38	135	3/16/2005
18S12W33BBB1	330651	922120	-29	141.18	112	3/16/2005
18S14W06CCD1	331039	923531	-167	398.58	232	3/15/2005
18S15W03DAB1	331104	923802	-134	373.72	240	2/23/2005
18S15W33ADA1	330659	923858	-121	374.03	253	3/15/2005
18S15W35DAC1	330636	923707	-89	290.20	201	3/15/2005
18S16W10CDD1	331000	924445	-146	327.54	182	3/16/2005
18S16W11AAB1	331041	924314	-151	375.97	225	3/14/2005
18S16W11DAC1	331011	924316	-151	422.53	272	3/15/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Union County—Continued						
18S16W12ACB1	331029	924232	-168	469.65	302	3/15/2005
18S16W28BBB1	330809	924611	-106	331.22	225	3/15/2005
18S17W22BDD1	330856	925056	-69	353.54	285	5/09/2005
18S18W11ACD2	331051	925615	-32	271.33	239	3/16/2005
19S10W16CBC1	330329	920904	-5	86.64	82	3/16/2005
19S11W23ACA1	330255	921229	-10	151.98	142	3/16/2005
19S11W25AAA1	330218	921113	-17	152.27	135	3/16/2005
19S12W13AAA1	330411	921717	33	157.83	191	3/16/2005
19S16W35DDC1	330109	924326	-72	247.08	175	3/15/2005
19S18W14ADA1	330452	925608	52	191.38	243	3/15/2005
Woodruff County						
05N01W11ABA1	350426	910407	155	55.76	211	4/04/2005
05N01W17DBB1	350311	910727	164	45.61	210	4/04/2005
05N02W31DCB3	350027	911456	181	11.64	193	4/04/2005
06N01W13ABA1	350852	910254	149	63.04	212	4/04/2005
06N01W13ADC1	350827	910247	146	66.03	212	4/04/2005
07N01W12BCB1	351442	910326	160	61.52	222	4/04/2005
08N01W12CDA1	351934	910311	153	72.04	225	4/04/2005
08N02W26ADC1	351726	911004	179	32.56	212	4/04/2005
State of Louisiana						
Bienville Parish						
Bi-76	321733	930350	234	45.98	280	4/07/2005
Bi-100	321402	925457	192	28.06	220	3/31/2005
Bi-112	321709	925239	125	90.27	215	3/31/2005
Bi-144	323505	925350	80	240.35	320	4/07/2005
Bi-166	322436	925005	78	182.18	260	4/07/2005
Bi-174	321856	925021	36	213.65	250	4/14/2005
Bi-192	321538	930016	216	69.31	285	4/07/2005
Bi-216	322119	925723	185	14.52	200	4/07/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Bienville Parish—Continued						
Bi-284	323241	930318	148	111.28	259	3/30/2005
Bi-291	321648	924804	-7	206.68	200	4/14/2005
Bi-293	322154	925009	61	178.68	240	4/14/2005
Bi-300	321305	924842	111	39.23	150	4/14/2005
Bossier Parish						
Bo-446	325720	933657	246	139.09	385	3/22/2005
Bo-475	324849	933756	203	201.91	405	3/22/2005
Bo-501	325425	933349	222	19.73	242	3/22/2005
Caldwell Parish						
Ca-27	321045	920607	24	36.05	60	4/05/2005
Ca-51	321430	921228	8	172.32	180	4/05/2005
Ca-86B	320154	921646	77	82.94	160	4/01/2005
Ca-106	321507	921452	-12	232.37	220	3/10/2005
Claiborne Parish						
Cl-9	325752	930827	84	276.20	360	3/10/2005
Cl-58	324707	930250	109	141.35	250	3/10/2005
Cl-111	324817	925125	10	290.04	300	3/10/2005
Cl-116	325232	924910	-18	262.50	245	3/10/2005
Cl-136	323943	925736	78	326.86	405	3/31/2005
Cl-148	325437	925033	-9	199.03	190	3/10/2005
Cl-149	330003	924500	-63	292.55	230	2/23/2005
Cl-149	330002	924459	-62	292.36	230	3/10/2005
Cl-150	325103	924349	-33	257.86	225	3/08/2005
Cl-180	324243	925620	68	291.97	360	3/10/2005
Cl-190	325414	930133	68	240.94	309	3/23/2005
Cl-215	324034	930935	188	252.26	440	3/02/2005
Cl-224	325122	930242	80	160.00	240	3/30/2005
Jackson Parish						
Ja-44	321446	924317	-3	172.99	170	4/14/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Jackson Parish—Continued						
Ja-49	321709	924524	-8	167.61	160	4/01/2005
Ja-99	322058	924326	16	209.20	225	4/29/2005
Ja-115	321822	922704	-20	200.48	180.3	4/15/2005
Ja-147	322357	923417	-34	254.48	220	4/01/2005
Ja-148	321338	923458	15	230.18	245	4/01/2005
Ja-149	322433	924121	5	189.51	195	4/01/2005
Ja-154	321429	924020	11	290.57	302	4/14/2005
Ja-159	322112	923634	-9	302.19	293	4/06/2005
Ja-166	321459	922329	3	216.72	220	4/15/2005
Lincoln Parish						
L-1	323144	923803	-86	386.11	300	3/11/2005
L-26	324141	923905	-36	190.92	155	4/04/2005
L-30	323105	923748	-65	394.56	330	3/11/2005
L-32	323138	923652	-73	352.56	280	3/11/2005
L-48	323130	923951	-63	300.91	238	3/16/2005
L-67	323236	924547	-5	325.06	320	4/01/2005
L-68	323458	922751	-78	258.12	180	4/05/2005
L-113	323013	924820	35	320.13	355	4/07/2005
L-117	324202	923226	-67	153.19	86	3/17/2005
L-137	323319	923920	-67	306.73	240	3/16/2005
L-138	323802	923459	-71	231.27	160	4/13/2005
L-152	322900	924041	-36	325.44	289.4	4/06/2005
L-160	322951	923823	-46	345.81	300	3/04/2005
L-178	323214	924648	31	304.38	335	3/29/2005
L-219	322917	924336	-34	333.90	300	4/06/2005
Morehouse Parish						
Mo-5	324626	915439	-46	163.52	117.44	4/05/2005
Mo-86	324636	914734	-13	107.69	95	3/09/2005
Mo-347	324352	915310	-35	177.26	142.27	3/17/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
Morehouse Parish—Continued						
Mo-350	325707	915747	-3	114.61	112.08	3/17/2005
Mo-423	324128	915218	-29	108.67	80	3/09/2005
Natchitoches Parish						
Na-512	320607	925944	222	18.41	240	4/11/2005
Na-519	320608	925946	224	16.14	240	4/11/2005
Na-534	320009	925436	121	26.12	147	4/12/2005
Na-562	313925	930444	105	55.39	160	3/22/2005
Ouachita Parish						
Ou-80	322843	920844	-226	285.71	60	4/05/2005
Ou-163	323155	920211	-61	140.95	80	4/18/2005
Ou-401A	322422	920207	-50	112.47	62.28	3/03/2005
Ou-402	321714	920414	2	61.47	63.3	3/03/2005
Ou-404	323030	915548	-28	88.76	60.89	3/03/2005
Ou-444	323100	921658	-120	237.77	118	4/06/2005
Ou-464	322808	920423	-110	180.19	70	4/21/2005
Ou-488	322418	922432	-65	344.68	280	4/08/2005
Ou-520	324150	920422	-76	156.24	80	4/21/2005
Ou-575	323203	921157	-157	352.01	195	4/21/2005
Ou-580	321929	921330	-51	266.02	215	4/19/2005
Sabine Parish						
Sa-389	312314	933529	181	78.72	260	4/26/2005
Union Parish						
Un-26	324417	920900	-62	195.89	133.92	4/05/2005
Un-79	324955	920840	-47	165.11	118	3/31/2005
Un-83	325550	923916	-49	171.17	122	4/04/2005
Un-84	325647	922415	-53	262.64	210	4/05/2005
Un-85	325938	922039	25	234.99	260	3/17/2005
Un-86	325929	921140	-22	111.58	90	3/17/2005
Un-134	323655	922117	-105	324.62	220	3/17/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
			Union Parish—Continued			
Un-135	324056	921212	-91	250.68	160	4/20/2005
Un-136	325555	923705	-57	276.81	220	3/29/2005
Un-138	324707	922925	-85	304.88	220	3/29/2005
Un-155	324850	922138	-90	290.20	200	3/30/2005
Un-157	324708	922310	-79	259.13	180	3/29/2005
Un-206	325409	923357	-75	284.71	210	4/21/2005
Un-209	324616	922417	-89	248.51	160	3/29/2005
Un-214	324925	922640	-108	297.54	190	3/30/2005
			Webster Parish			
Wb-219	323220	931659	184	5.90	190	3/02/2005
Wb-241	325938	932753	179	50.60	230	3/23/2005
Wb-271	323221	931404	195	82.73	278	3/15/2005
Wb-285	323553	931411	175	165.20	340	3/02/2005
Wb-326	325200	931517	148	111.98	260	3/01/2005
Wb-331	324835	932508	164	55.67	220	3/15/2005
Wb-335	324040	932512	189	30.65	220	3/31/2005
Wb-338	330040	931900	136	93.87	230	3/01/2005
Wb-349	323630	931736	118	62.21	180	3/03/2005
Wb-355	330008	932643	172	72.51	245	3/23/2005
Wb-399	325518	932219	163	41.93	205	4/04/2005
Wb-419	324021	931916	157	73.31	230	3/04/2005
Wb-423	324823	931653	124	276.46	400	3/14/2005
Wb-424	322912	931103	223	56.82	280	3/02/2005
Wb-467	323540	932132	174	36.05	210	3/04/2005
Wb-475	323533	932003	158	14.67	173	3/01/2005
Wb-481	324920	932505	156	70.62	227	3/15/2005
Wb-490	324118	931439	153	228.49	381	3/04/2005
Wb-6289Z	323408	932211	144	51.39	195	3/24/2005

Appendix 1. Water-level data collected during spring 2005 from wells completed in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[NGVD of 1929, National Geodetic Vertical Datum of 1929; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Water-level altitude (feet above NGVD of 1929)	Depth to water (feet below land surface)	Land-surface datum (feet above NGVD of 1929)	Date of measurement
			Winn Parish			
W-28	315527	923708	42	63.35	105	4/01/2005
W-144B	315450	923101	83	56.53	140	3/07/2005
W-156	320619	923416	41	216.36	257	4/08/2005
W-161	315646	923520	50	109.83	160	4/13/2005
W-172	320541	922916	40	100.48	140	4/01/2005
W-179	315948	923003	71	123.81	195	3/07/2005
W-212	320444	923849	48	221.80	270	4/08/2005
W-223	315009	925344	107	93.14	200	4/12/2005

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana.

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
State of Arkansas					
Arkansas County					
02S04W06CDB1	343312	912849	166.52	154.52	12.0
02S04W23DAA1	343044	912355	148.40	143.61	4.8
02S04W33BBB1	342922	912703	162.98	149.96	13.0
02S05W16CBB1	343144	913319	188.12	168.10	20.0
02S05W34BDA1	342925	913148	185.61	174.64	11.0
02S05W35AAB1	342930	913035	183.88	171.05	12.8
03S04W02CCB1	342748	912458	155.58	144.05	11.5
03S04W26CDA1	342421	912438	143.20	137.79	5.4
03S05W02AAB1	342842	913034	179.14	165.61	13.5
03S05W13BDC1	342631	913005	176.69	171.74	4.9
03S05W15CBB1	342633	913229	176.48	163.54	12.9
03S05W18CAB1	342629	913525	168.68	156.28	12.4
03S05W28DAB1	342447	913240	175.51	167.89	7.6
03S06W30BBD1	342516	914216	161.63	161.27	0.4
04S01W04CBD1	342225	910808	114.00	107.52	6.5
04S04W19CBB1	342004	912929	164.74	151.75	13.0
04S04W22DAA1	342007	912515	158.78	155.51	3.3
04S05W01BAA1	342322	912956	167.05	188.56	-21.5
04S05W05ACC1	342303	913413	161.60	151.05	10.6
04S05W15AAA1	342132	913133	169.67	159.17	10.5
04S05W36DCC1	341752	913004	164.56	153.85	10.7
05S01W17BAA1	341551	910745	94.23	89.08	5.2
05S03W04ADB1	341734	912007	157.88	156.52	1.4
05S04W26ACA1	341358	912434	131.10	119.78	11.3
05S05W36DAA1	341245	912947	142.27	133.87	8.4
06S02W06ABB1	341228	911620	115.23	102.32	12.9
06S02W17ADA1	341023	911453	113.19	104.83	8.4
06S02W22CDB1	340904	911331	112.29	98.12	14.2

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Arkansas County—Continued					
06S03W27BAA1	340859	912009	120.06	112.51	7.6
07S02W28ABA1	340340	911411	105.26	98.23	7.0
07S03W06ABC1	340702	912248	126.85	122.84	4.0
08S02W09BCC1	340031	911448	99.70	95.88	3.8
Ashley County					
15S07W32CDD1	332118	915101	133.55	138.72	-5.2
17S09W15ACC1	331334	920116	21.24	17.97	3.3
Bradley County					
13S09W06ACB2	333647	920417	178.77	166.75	12.0
13S11W17BCD1	333454	921607	190.61	201.02	-10.4
16S12W21CAA1	331839	922052	73.62	74.26	-0.6
Calhoun County					
11S14W12CAC3	334630	922928	144.73	146.51	-1.8
13S13W32CDA1	333227	922742	169.49	170.27	-0.8
13S15W36CBD1	333227	923532	80.62	77.12	3.5
14S13W12CCB1	333040	922404	168.01	170.89	-2.9
14S15W16BAA1	333055	923912	97.04	96.29	0.8
Chicot County					
13S03W22DAD1	333312	912308	68.25	68.28	0.0
Cleveland County					
09S11W01DCA1	335729	921134	204.82	207.21	-2.4
09S11W11CDB1	335623	921251	160.12	161.94	-1.8
10S09W23CDC1	334918	920021	160.02	162.56	-2.5
10S12W12BDD1	335133	921743	116.91	119.04	-2.1
11S11W16AAB1	334543	921423	194.21	203.83	-9.6
Columbia County					
15S20W20CCB1	332453	931215	222.25	216.13	6.1
16S20W08DCC1	332114	931141	287.14	317.23	-30.1
16S20W18ACD1	332053	931237	285.21	262.50	22.7
16S21W14CBB1	332049	931517	214.66	198.31	16.4

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Columbia County—Continued					
16S22W22CCD1	331948	932225	148.26	146.87	1.4
17S19W17ACA1	331538	930536	265.38	247.20	18.2
17S19W18CBD1	331517	930656	274.65	269.07	5.6
17S19W19BCA1	331433	930705	274.90	273.69	1.2
17S19W30ABB1	331406	930650	219.93	221.74	-1.8
17S20W17CDA1	331520	931201	308.34	317.24	-8.9
17S20W36ABC1	331307	930755	297.47	296.42	1.1
17S21W01BBC1	331743	931424	309.53	269.75	39.8
17S21W08DCA1	331613	931758	218.65	210.87	7.8
17S21W11DCC2	331609	931449	287.45	278.57	8.9
17S21W17BAB1	331608	931820	207.05	203.27	3.8
17S22W22ABB1	331522	932210	141.98	137.00	5.0
17S22W23BBB1	331521	932137	139.66	136.11	3.5
18S20W08CBC1	331115	931227	272.62	273.44	-0.8
18S20W10CAA1	331054	931016	277.20	277.51	-0.3
18S21W01ACC1	331223	931339	293.34	299.63	-6.3
18S22W27DDD1	330835	932159	137.34	133.64	3.7
19S20W09CBD1	330555	931129	267.13	265.92	1.2
19S23W10ABD1	330644	932833	45.85	43.52	2.3
19S23W11CDA2	330609	932744	53.33	52.45	0.9
19S23W11DDB1	330605	932722	55.16	54.03	1.1
19S23W14BAB2	330555	932752	42.45	50.46	-8.0
20S22W03DCC1	330138	932236	52.98	52.07	0.9
20S22W11ACD1	330109	932133	108.05	107.13	0.9
Craighead County					
13N03E23CDD1	354404	904433	86.13	87.15	-1.0
14N04E22CBD1	354929	903921	58.68	55.27	3.4
14N04E28DBD1	354837	903953	61.04	60.31	0.7
14N05E36CBC1	354751	903100	14.42	10.76	3.7
15N03E31ADA1	355314	904807	59.26	55.90	3.4

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Craighead County—Continued					
15N04E20ADB1	355506	904043	120.71	118.18	2.5
15N05E29DBB1	355360	903433	30.21	21.08	9.1
15N06E18ACA1	355544	902858	19.48	15.31	4.2
Crittenden County					
05N08E11CCA2	350345	901300	28.56	22.94	5.6
06N07E01DAD2	350958	901738	25.73	22.53	3.2
06N09E08DCC1	350850	900922	8.19	8.10	0.1
06N09E23AAB1	350745	900553	60.98	61.57	-0.6
Cross County					
06N04E06ACA1	351004	904238	202.82	201.92	0.9
07N05E04ADD1	351538	903330	33.43	36.08	-2.7
09N01E16CAC1	352405	905951	77.76	81.37	-3.6
09N03E22AAB2	352404	904518	124.71	126.92	-2.2
09N03E22AAD1	352403	904512	127.62	130.19	-2.6
09N04E30DCA1	352232	904218	261.66	265.67	-4.0
Dallas County					
07S14W30DCC1	340431	923360	119.63	119.65	0.0
07S14W31AAA1	340425	923334	109.72	109.53	0.2
07S16W20CAB1	340555	924545	25.34	24.97	0.4
08S15W34BDC1	335859	923730	25.52	25.63	-0.1
08S16W18ACC1	340152	924639	15.16	16.03	-0.9
08S16W27DDD1	335937	924307	33.19	32.77	0.4
09S13W35CCD1	335309	922413	70.59	71.36	-0.8
09S14W01BDC1	335754	922919	78.31	78.66	-0.3
09S16W19CAA1	335605	924701	5.61	6.03	-0.4
10S13W34ACA2	334829	922458	149.50	151.47	-2.0
10S15W18BCC1	335120	924120	77.56	75.78	1.8
Desha County					
09S02W26AAC1	335346	911521	71.32	68.91	2.4
09S04W28DDD1	335310	913007	115.73	112.54	3.2

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
		Desha County—Continued			
10S02W26CCC2	334750	911624	70.99	71.24	-0.3
10S04W11CBC1	335034	912905	90.86	102.90	-12.0
11S02W03CCA1	334616	911711	68.18	69.02	-0.8
12S03W26CBB1	333749	912259	91.08	95.39	-4.3
12S03W34DAD1	333643	912305	100.82	77.50	23.3
		Drew County			
11S04W02ACA2	334632	912827	90.82	93.47	-2.7
11S04W25CB2	334249	912707	82.78	85.87	-3.1
11S06W11DBC1	334607	914122	148.29	151.52	-3.2
12S06W30BBD1	333807	914543	220.42	223.83	-3.4
12S06W32DAD1	333649	914402	159.68	170.35	-10.7
13S05W36ACB1	333151	913408	88.83	90.31	-1.5
15S04W12DDA1	332429	912724	60.90	62.32	-1.4
		Grant County			
03S13W12AAA1	342846	922106	131.16	131.01	0.2
03S15W26DAA1	342601	923447	8.93	9.87	-0.9
04S14W14CCC1	342201	922932	81.68	81.23	0.5
05S13W03CAA1	341844	922400	89.53	82.09	7.4
05S13W03CDA4	341838	922402	114.68	110.63	4.1
05S13W07ADB1	341810	922650	59.32	59.43	-0.1
05S13W30AAA1	341550	922650	120.00	120.09	-0.1
05S14W06DCC1	341843	923327	90.82	86.47	4.3
05S15W05ABD1	341924	923827	16.61	16.97	-0.4
06S11W05ACD1	341341	921413	204.63	209.74	-5.1
06S15W26ACA1	341022	923538	68.14	65.53	2.6
		Jefferson County			
03S08W19BAD1	342624	915444	185.55	171.47	14.1
03S08W19BBD1	342628	915505	175.43	166.74	8.7
03S08W19BDB1	342619	915455	179.68	168.38	11.3
03S09W23BBD1	342627	915713	177.68	165.45	12.2

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Jefferson County—Continued					
03S10W14CAD1	342659	920330	120.13	113.80	6.3
03S10W27AAD1	342502	920434	147.81	126.25	21.6
03S11W22ABC1	342651	921058	169.86	174.99	-5.1
04S07W17BCC1	342140	914742	186.39	168.40	18.0
04S08W35BBD1	341909	915056	216.48	207.50	9.0
04S09W11BAA1	342309	915702	140.82	135.51	5.3
04S09W32BDA1	341925	920017	130.75	126.91	3.8
04S10W17BDA1	342212	920646	191.34	191.72	-0.4
04S10W29ADB1	342025	920625	209.17	207.96	1.2
04S11W14BAD1	342220	921000	309.76	309.76	0.0
05S08W30ADB1	341452	915440	275.99	297.47	-21.5
05S08W30CBA1	341446	915527	294.55	290.93	3.6
05S09W24DBD1	341530	915556	281.09	277.12	4.0
05S09W31DDC1	341337	920109	282.54	276.94	5.6
05S09W35AAB1	341420	915653	286.26	250.58	35.7
05S10W11ACA1	341741	920322	170.57	171.02	-0.5
05S10W16BAD1	341700	920549	245.42	241.67	3.8
05S10W16DBB1	341635	920543	294.27	294.23	0.0
05S10W16DBD1	341635	920534	279.79	283.89	-4.1
06S08W16CCC1	341143	915517	257.79	255.74	2.1
06S08W25ADC1	341025	915116	226.17	225.65	0.5
06S09W17CAD1	341159	920207	273.06	258.15	14.9
06S09W17CCA1	341152	920221	279.17	267.95	11.2
06S10W23ACA2	341123	920504	236.03	223.68	12.4
06S10W23ACD1	341116	920508	231.92	223.97	7.9
06S10W23DBA1	341105	920506	246.87	237.29	9.6
07S07W24BAB1	340633	914523	165.44	164.84	0.6
07S10W24CAC1	340549	920421	303.45	305.17	-1.7
Lafayette County					
16S23W12CAD1	332143	932609	71.72	74.85	-3.1

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Lafayette County—Continued					
16S24W26AAC1	331950	933303	51.86	54.65	-2.8
17S23W19ACC1	331520	933128	52.49	51.57	0.9
17S24W23BBD1	331526	933403	31.68	31.87	-0.2
18S23W29ACC1	330911	933039	10.36	12.23	-1.9
19S23W29BDB1	330352	933103	40.81	41.56	-0.8
19S25W13CAB1	330555	933922	35.52	38.50	-3.0
20S23W05ADB1	330223	933036	39.85	40.15	-0.3
Lee County					
01N04E09CDD1	344210	904119	54.98	59.65	-4.7
02N01E10CAD1	344743	905925	48.30	51.88	-3.6
03N03E28CDB1	345006	904749	53.55	61.97	-8.4
Lincoln County					
07S07W30CDC1	340444	915043	179.24	180.38	-1.1
08S04W22AAA1	340105	912753	116.14	119.87	-3.7
08S05W03BAA2	340310	913454	141.34	147.58	-6.2
08S05W35ACC1	335907	913337	133.71	139.97	-6.3
08S06W31DCC1	335850	914358	129.67	132.63	-3.0
08S08W35DBB1	335858	915222	202.77	201.98	0.8
08S08W35DCB1	335851	915217	216.48	210.54	5.9
09S07W07DAD1	335634	915128	259.80	268.54	-8.7
Lonoke County					
01N07W03BCC1	344425	914503	127.07	127.91	-0.8
01S08W02DBD1	343855	914960	95.94	97.32	-1.4
02N07W06ACD1	344939	914737	119.84	121.48	-1.6
02N07W09AAA1	344906	914500	129.14	98.77	30.4
02N07W22DBA1	344651	914426	123.48	128.45	-5.0
02N07W24DAC1	344650	914209	139.42	146.54	-7.1
02N07W32DDD1	344453	914619	123.57	129.33	-5.8
02S08W16BDA1	343228	915232	123.80	119.77	4.0
03N07W03CAA1	345445	914426	76.91	78.28	-1.4

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Lonoke County—Continued					
03N07W23CCC1	345144	914350	90.51	85.33	5.2
03N08W11ACD1	345403	914935	83.70	91.62	-7.9
03N08W22DAD1	345205	915024	90.30	92.69	-2.4
03N08W22DAD2	345205	915024	91.92	96.57	-4.6
03N08W22DDD2	345152	915025	96.85	96.24	0.6
Monroe County					
01N03W14CCB1	344144	911801	71.57	72.73	-1.2
03N01W33CDD1	345446	910635	65.25	68.01	-2.8
03N02W26DAB1	345042	911026	47.04	47.13	-0.1
04N02W28DDD4	345535	911221	30.60	30.49	0.1
04N02W30BAC1	345617	911504	14.81	14.59	0.2
04N02W30BAD1	345617	911515	10.18	9.86	0.3
Nevada County					
14S21W04CCB1	333251	931708	59.12	58.44	0.7
Ouachita County					
11S15W27ABD1	334441	923726	68.03	71.72	-3.7
11S17W14CAC1	334631	924927	16.35	18.70	-2.4
11S17W36CCA1	334341	924834	5.03	7.18	-2.2
11S18W20AAA1	334614	925759	42.18	44.10	-1.9
12S15W09BBA1	334223	923922	94.74	70.57	24.2
12S18W19CDC1	334014	925951	36.69	8.00	28.7
12S18W25CAB1	333937	925442	76.46	77.43	-1.0
12S19W09BAB1	334251	930352	6.77	10.01	-3.2
12S19W14AAA1	334143	930105	2.81	5.03	-2.2
12S19W35BDD1	333901	930146	156.62	156.23	0.4
13S16W28ADD1	333416	924451	54.56	32.19	22.4
13S18W31BDD1	333343	925956	66.47	70.02	-3.6
13S19W28BCD1	333434	930418	36.04	36.22	-0.2
14S17W05CAD1	333238	925255	36.73	36.93	-0.2
14S17W32CAD1	332803	925251	85.56	81.86	3.7

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Ouachita County—Continued					
14S19W29ABB1	332941	930513	87.04	87.52	-0.5
15S18W36ADD1	332311	925436	95.72	95.43	0.3
15S19W10DCC1	332618	930318	63.53	73.25	-9.7
15S19W21CDD2	332438	930432	192.44	198.38	-5.9
Phillips County					
01S02E32DDC1	343324	905455	80.88	80.79	0.1
02S02E01ADC1	343323	905056	38.81	36.62	2.2
02S04E02DBA1	343243	903907	106.26	112.84	-6.6
02S05E16BCB1	343108	903526	38.58	33.52	5.1
02S05E29CCC1	342851	903635	31.09	34.96	-3.9
03S03E30DAA1	342403	904915	43.43	43.88	-0.5
03S05E05BAB1	342755	903621	46.04	55.54	-9.5
04S02E25CCC1	341824	905121	35.65	35.99	-0.3
Poinsett County					
10N01E12BDC1	353026	905630	91.39	95.10	-3.7
10N01E15DBB1	352931	905825	93.26	94.74	-1.5
10N01E33ABA1	352725	905924	73.99	75.44	-1.5
10N03E02BCD1	353139	904447	117.94	109.89	8.1
10N03E23CAC1	352850	904432	108.56	111.69	-3.1
11N02E16CCC1	353448	905321	101.67	105.49	-3.8
11N03E25BDD1	353325	904323	131.56	120.71	10.9
12N03E12BBB1	354137	904340	93.07	96.67	-3.6
12N03E35BCC1	353745	904456	96.44	102.24	-5.8
12N03E35DDA1	353727	904353	98.74	101.36	-2.6
Prairie County					
01N05W19CDC1	344113	913505	166.94	139.47	27.5
01N06W02ABB1	344442	913701	142.82	115.65	27.2
01N06W34CBB1	343943	913846	169.88	155.79	14.1
01S05W06BCB1	343904	913532	166.88	148.65	18.2
01S05W20ABB1	343640	913352	175.23	158.85	16.4

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Prairie County—Continued					
01S06W01BDD2	343859	913613	174.24	163.98	10.3
01S06W11DBD1	343749	913654	178.84	164.72	14.1
02N04W19ACB1	344649	912802	92.94	91.13	1.8
02N06W19AAB1	344718	914050	139.85	138.21	1.6
02N06W20BCB1	344707	914033	138.88	142.00	-3.1
02N06W22BDD1	344654	913801	148.04	118.96	29.1
03N05W03ADA2	345452	913043	63.08	60.03	3.1
03N05W20CCC1	345145	913356	69.39	70.41	-1.0
03N06W20CDD1	345140	914004	82.66	83.79	-1.1
St. Francis County					
04N04E18BAB1	345743	904319	68.29	63.28	5.0
Union County					
16S14W15CAB1	331944	923218	155.71	160.88	-5.2
16S15W20DAA1	331860	923958	286.15	288.32	-2.2
16S15W31ACC1	331717	924129	309.60	294.15	15.5
16S16W02ABC1 Smackover	332206	924329	173.24	168.36	4.9
16S18W34ABC2	331806	925709	211.82	205.26	6.6
17S12W31DDD1	331206	922226	235.50	238.11	-2.6
17S12W32BBC1	331202	922219	249.84	250.58	-0.7
17S13W31BAC1	331200	922916	294.40	306.13	-11.7
17S15W08CDD1	331505	924027	348.64	325.58	23.1
17S15W18DBB1 Monsanto	331439	924129	375.68	331.10	44.6
17S15W28DBA1	331246	923910	406.71	390.80	15.9
17S15W28DCC1	331233	923924	460.82	437.19	23.6
17S15W29CDC1	331229	924039	412.08	373.46	38.6
17S15W31DCA1	331145	924117	450.84	425.27	25.6
17S15W31DDA1	331144	924105	438.58	414.99	23.6
17S16W01BAA1	331649	924233	332.22	308.53	23.7
17S16W02CCC1	331559	924403	345.47	336.32	9.2

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Union County—Continued					
17S16W02DCD1	331602	924326	397.80	387.68	10.1
17S16W12CDD1	331506	924232	405.40	406.31	-0.9
17S16W24BDB1	331357	924248	401.68	394.04	7.6
17S17W30DCD1	331257	925356	316.28	321.93	-5.7
18S12W33BBB1	330651	922120	136.18	141.18	-5.0
18S14W06CCD1	331039	923531	380.87	398.58	-17.7
18S15W33ADA1	330659	923858	377.80	374.03	3.8
18S15W35DAC1	330636	923707	303.26	290.20	13.1
18S16W10CDD1	331000	924445	330.09	327.54	2.5
18S16W11AAB1	331041	924314	389.81	375.97	13.8
18S16W11DAC1	331011	924316	431.40	422.53	8.9
18S16W28BBB1	330809	924611	336.26	331.22	5.0
18S17W22BDD1	330856	925056	371.20	353.54	17.7
18S18W11ACD2	331051	925615	284.76	271.33	13.4
19S10W16CBC1	330329	920904	83.80	86.64	-2.8
19S11W23ACA1	330255	921229	146.78	151.98	-5.2
19S11W25AAA1	330218	921113	153.34	152.27	1.1
19S16W35DDC1	330109	924326	247.48	247.08	0.4
Woodruff County					
05N01W11ABA1	350426	910407	55.99	55.76	0.2
05N01W17DBB1	350311	910727	44.73	45.61	-0.9
05N02W31DCB3	350027	911456	13.55	11.64	1.9
07N01W12BCB1	351442	910326	62.02	61.52	0.5
08N01W12CDA1	351934	910311	75.52	72.04	3.5
State of Louisiana					
Bienville Parish					
Bi-144	323505	925350	238.22	240.35	-2.1
Caldwell Parish					
Ca-86B	320154	921646	79.96	82.94	-3

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
Claiborne Parish					
Cl-111	324817	925125	288.47	290.04	-1.6
Cl-116	325232	924910	263.11	262.50	0.6
Cl-136	323943	925736	324.27	326.86	-2.6
Cl-148	325437	925033	199.74	199.03	0.7
Cl-149	330002	924459	296.68	292.55	4.1
Cl-149	330002	924459	296.68	292.36	4.3
Jackson Parish					
Ja-49	321709	924524	177.86	167.61	10.3
Ja-147	322357	923417	252.59	254.48	-1.9
Ja-148	321338	923458	228.7	230.18	-1.5
Lincoln Parish					
L-26	324141	923905	186.82	190.92	-4.1
L-137	323319	923920	303.25	306.73	-3.5
Morehouse Parish					
Mo-350	325707	915747	109.88	114.61	-4.7
Ouachita Parish					
Ou-402	321714	920414	58.64	61.47	-2.8
Ou-404	323030	915548	86.61	88.76	-2.2
Ou-488	322418	922432	341.45	344.68	-3.2
Union Parish					
Un-26	324417	920900	194.23	195.89	-1.7
Un-79	324955	920840	161.7	165.11	-3.4
Un-83	325550	923916	174.84	171.17	3.7
Un-84	325647	922415	259.06	262.64	-3.6
Un-86	325929	921140	105.95	111.58	-5.6
Un-134	323655	922117	318.56	324.62	-6.1
Un-157	324708	922310	254.32	259.13	-4.8
Webster Parish					
Wb-338	330040	931900	94.74	93.87	0.9
Wb-399	325518	932219	44.06	41.93	2.1

Appendix 2. Difference in water level from 2001 to 2005 in the Sparta-Memphis aquifer in Arkansas and Louisiana. —Continued

[Horizontal datum is NAD of 1983; negative values denote a decline; 2001 depth to water level (Schrader, 2004)]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	2001 depth to water (feet below land-surface datum	2005 depth to water (feet below land-surface datum	Difference in water level from 2001 to 2005 (feet)
		Winn Parish			
W-28	315527	923708	58.11	63.35	-5.2
W-144B	315450	923101	51.9	56.53	-4.6
W-172	320541	922916	97.78	100.48	-2.7
W-179	315948	923003	119.86	123.81	-4.0

Appendix 3. Specific conductance and temperature data collected from wells completed in the Sparta-Memphis aquifer in Arkansas, spring 2005.

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Well depth (feet)	Aquifer	Date sampled	Specific conductance (μS/cm)	Temperature (degrees Celsius)
Arkansas County							
03S04W26CDA1	342421	912438	666	Sparta	04/18/2005	349	23.6
04S01W04CBD1	342225	910808	713	Sparta	04/15/2005	845	24.0
05S03W04ADB1	341734	912007	768	Sparta	04/14/2005	396	23.7
07S03W06ABC1	340702	912248	720	Sparta	04/14/2005	212	22.9
Ashley County							
15S07W32CDD1	332118	915101	1,000	Sparta	03/23/2005	875	24.8
Bradley County							
13S09W06ACB2	333647	920417	1,022	Sparta	03/18/2005	365	23.1
13S11W17BCD1	333454	921607	680	Sparta	03/18/2005	444	23.2
Calhoun County							
13S13W32CDA1	333227	922742	450	Sparta	03/17/2005	432	23.1
14S13W12CCB1	333040	922404	613	Sparta	03/17/2005	446	23.2
Cleveland County							
09S11W01DCA1	335729	921134	558	Sparta	03/29/2005	278	22.5
10S09W35ACD1	334758	915957	618	Sparta	03/29/2005	239	22.8
11S11W16AAB1	334543	921423	815	Sparta	03/29/2005	370	22.6
Columbia County							
17S19W15AAB1	331546	930318	580	Sparta	03/09/2005	354	24.1
18S22W27DDD1	330835	932159	516	Sparta	03/09/2005	239	21.7
19S23W11CDA2	330609	932744	385	Sparta	03/09/2005	189	21.2
Craighead County							
14N04E22CBD1	354929	903921	240	Memphis	04/06/2005	131	19.0
14N04E28DBD1	354837	903953	210	Memphis	04/06/2005	158	21.9
Crittenden County							
06N09E23AAB1	350745	900553	338	Memphis	04/05/2005	240	22.9
Cross County							
09N03E22ABD1	352404	904518	350	Memphis	04/05/2005	340	25.3

Appendix 3. Specific conductance and temperature data collected from wells completed in the Sparta-Memphis aquifer in Arkansas, spring 2005. —Continued

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Well depth (feet)	Aquifer	Date sampled	Specific conductance (μS/cm)	Temperature (degrees Celsius)
Cross County—Continued							
09N04E30DCA1	352232	904218	1,132	Memphis	04/05/2005	480	22.7
Dallas County							
07S14W31AAA	340425	923334	545	Sparta	03/07/2005	129	21.1
09S16W19CAA1	335605	924701	28.2	Sparta	03/07/2005	99.3	21.0
10S13W34ACA2	334829	922458	888	Sparta	03/07/2005	269	24.0
Desha County							
09S02W26AAC1	335346	911521	626	Sparta	03/24/2005	260	22.5
10S04W11CBC1	335034	912905	830	Sparta	03/24/2005	253	25.6
12S03W26CBB1	333749	912259	819	Sparta	03/24/2005	385	24.4
Drew County							
12S06W30BBD1	333807	914543	779	Sparta	03/23/2005	287	23.0
13S05W36ACB1	333151	913408	692	Sparta	03/23/2005	343	22.3
Grant County							
05S13W03CAA1	341844	922400	569	Sparta	04/20/2005	93.4	21.0
05S14W06DCC1	341843	923327	370	Sparta	04/21/2005	107	21.8
05S15W05ABD1	341924	923827	190	Sparta	04/21/2005	64.4	19.4
06S15W26ACA1	341022	923538	172	Sparta	04/20/2005	50.0	18.6
Jefferson County							
03S11W22ABC1	342651	921058	707	Sparta	04/13/2005	91.0	22.0
04S07W17BCC1	342140	914742	756	Sparta	04/12/2005	153	22.7
04S11W14BAD1	342220	921000	854	Sparta	04/13/2005	93.2	22.8
05S10W16DBD	341635	920534	865	Sparta	04/12/2005	161	20.7
Lafayette County							
19S23W29BDB1	330352	933103	250	Sparta	03/08/2005	397	24.2
Lee County							
03N03E28CDB1	345006	904749	591.5	Sparta	04/04/2005	1,356	20.5
Lincoln County							
07S07W30CDC1	340444	915043	1,350	Sparta	04/11/2005	220	28.3

Appendix 3. Specific conductance and temperature data collected from wells completed in the Sparta-Memphis aquifer in Arkansas, spring 2005. —Continued

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Well depth (feet)	Aquifer	Date sampled	Specific conductance (μS/cm)	Temperature (degrees Celsius)
Lincoln County—Continued							
08S05W35ACC1	335907	913337	836	Sparta	04/11/2005	245	25.9
08S08W35DBB1	335858	915222	974	Sparta	04/11/2005	198	26.3
08S08W35DCB1	335851	915217	1,062	Sparta	04/11/2005	193	22.3
09S07W07DAD1	335634	915128	1,052	Sparta	04/11/2005	420	24.6
Monroe County							
01N03W14CCB1	344144	911801	595	Sparta	03/31/2005	893	20.2
04N02W30BAD1	345617	911515	285	Memphis	03/31/2005	777	18.3
Nevada County							
14S21W04CCB1	333251	931708	210	Sparta	03/08/2005	205	20.1
14S21W20AAB1	333050	931723	190	Sparta	03/08/2005	194	20.2
Ouachita County							
12S19W14AAA1	334143	930105	60	Sparta	03/17/2005	32.7	17.9
13S19W28BCD1	333434	930418	52	Sparta	03/22/2005	56.3	20.5
15S18W36ADD1	332311	925436	220	Sparta	03/22/2005	382	20.9
15S19W10DCC1	332618	930318	375	Sparta	03/23/2005	191	20.3
Phillips County							
02S02E01ADC1	343323	905056	686	Sparta	03/31/2005	985	20.7
03S05E05BAB1	342755	903621	514	Sparta	03/31/2005	782	18.9
04S02E25CCC1	341824	905121	930	Sparta	03/31/2005	1,240	22.0
Poinsett County							
11N03E25BDD1	353325	904323	250	Memphis	04/06/2005	401	19.3
Prairie County							
02N04W19ACB1	344649	912802	482	Sparta	03/31/2005	349	19.1
Union County							
16S15W20DAA1	331860	923958	603	Sparta	03/15/2005	553	23.7
16S18W34ABC2	331806	925709	465	Sparta	03/15/2005	338	21.7
18S14W06CCD1	331039	923531	783	Sparta	03/15/2005	742	23.4
18S16W11DAB1	331011	924316	767	Sparta	03/15/2005	536	23.1

Appendix 3. Specific conductance and temperature data collected from wells completed in the Sparta-Memphis aquifer in Arkansas, spring 2005. —Continued

[µS/cm, microsiemens per centimeter at 25 degrees Celsius; Horizontal datum is NAD of 1983]

Station name	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Well depth (feet)	Aquifer	Date sampled	Specific conductance (µS/cm)	Temperature (degrees Celsius)
			Woodruff County				
05N02W31DCB1	350028	911456	250	Memphis	04/04/2005	183	19.6