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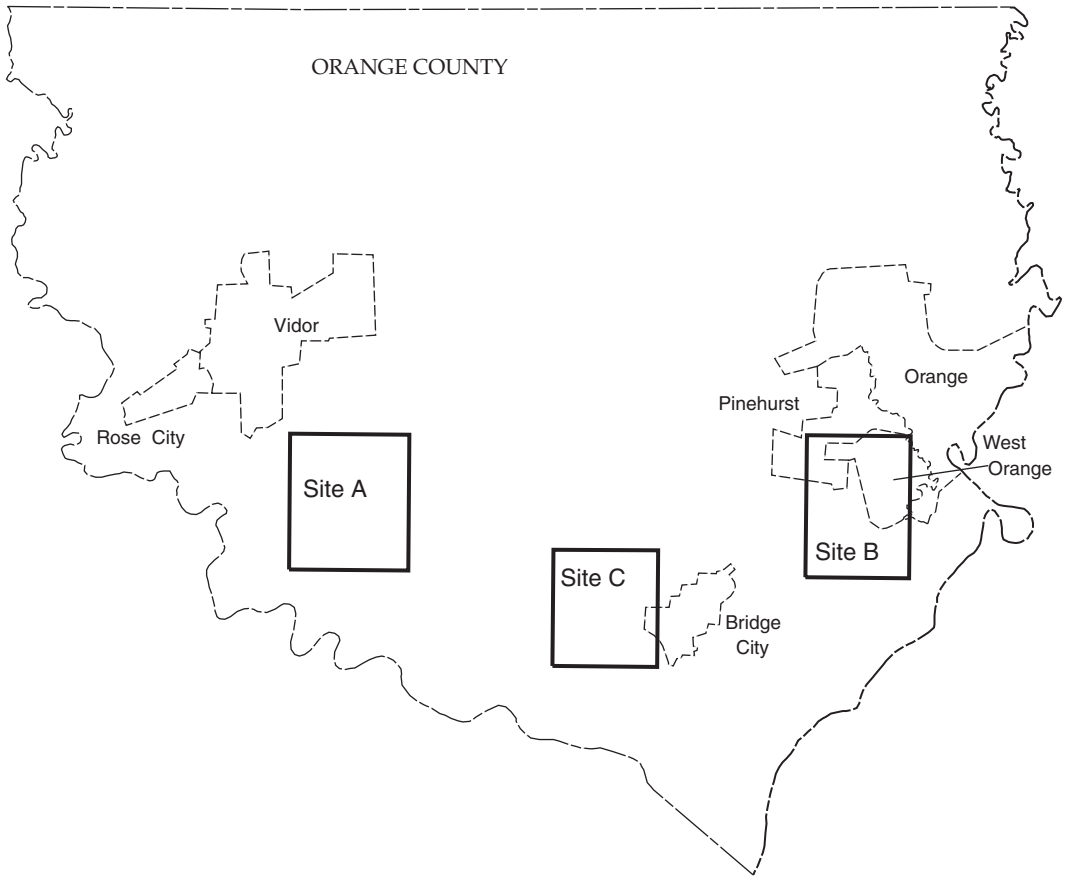
Ground-Water Data in Orange County and Adjacent Counties, Texas, 1985–90

Open-File Report 99–603



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By Mark C. Kasmarek

U.S. GEOLOGICAL SURVEY
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Austin, Texas
1999

U.S. DEPARTMENT OF THE INTERIOR

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VERTICAL DATUM AND ABBREVIATIONS

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviations:

°C, degree Celsius
ft, foot
in., inch
mg/L, milligram per liter
mi, mile
Mgal/d, million gallons per day
µS/cm, microsiemens per centimeter at 25 degrees Celsius

Ground-Water Data in Orange County and Adjacent Counties, Texas, 1985–90

By Mark C. Kasmarek

Abstract

The lower unit of the Chicot aquifer is a major source of freshwater for Orange County, Texas. In 1989, the average rate of ground-water withdrawal from the lower unit of the Chicot aquifer in Orange County for municipal and industrial use was 13.8 million gallons per day, a substantial decrease from the historical high of 23.1 million gallons per day in 1972. The average withdrawal for industrial use decreased substantially from 14.4 million gallons per day during 1963–84 to 6.9 million gallons per day during 1985–89. The average withdrawal for municipal use during 1985–89 was 6.8 million gallons per day, similar to the average withdrawal of 5.8 million gallons per day during 1963–84.

Water levels in wells in most of the study area rose during 1985–90. The largest rise in water levels was more than 10 feet in parts of Orange and Pinehurst, north of site B (one of three areas of ground-water withdrawal for industrial use), while the largest decline in water levels was a localized decline of more than 60 feet at site C in south-central Orange County (also an area of withdrawal for industrial use).

Chemical analyses of ground-water samples from the lower Chicot aquifer during 1985–90 indicate that the aquifer contained mostly freshwater (dissolved solids concentrations less than 1,000 milligrams per liter). Dissolved chloride concentrations remained relatively constant in most wells during 1985–90 but could vary greatly between wells within short distances. Saline-water encroachment continued to occur during 1985–89 but at a slower rate than in the 1970s and early 1980s. On the basis of chemical data collected during 1985–89, a relation was determined between specific conductance and dissolved chloride concentration that can be used to estimate dissolved chloride by multiplying the specific conductance by different factors for low or high conductances.

INTRODUCTION

A continuing program to study the ground-water resources in Orange County and adjacent counties in Texas was begun in March 1967 by the U.S. Geological Survey in cooperation with the Texas Water Development Board and the Sabine River Authority. Since 1979, this program has been conducted in cooperation with the Orange County Commissioner's Court. Orange County is the principal part of the study area (fig. 1) where data were collected pertinent to the ground-water resources. Ancillary data were collected in adjacent Hardin, Jasper, Jefferson, and Newton Counties.

The ground-water program, which consists of monitoring and appraising withdrawals of ground water, water levels, and water quality, was initiated to document water-level changes and saline-water encroachment. The overall objectives of the program are to provide the following:

1. An inventory of all new large-capacity wells and the compilation of drillers logs.
2. The establishment and maintenance of a network of observation wells for monitoring changes in water levels and water quality, especially dissolved chloride concentrations.
3. An annual inventory of withdrawal for municipal supply and industrial use.
4. The correlation of current data with previously collected data.

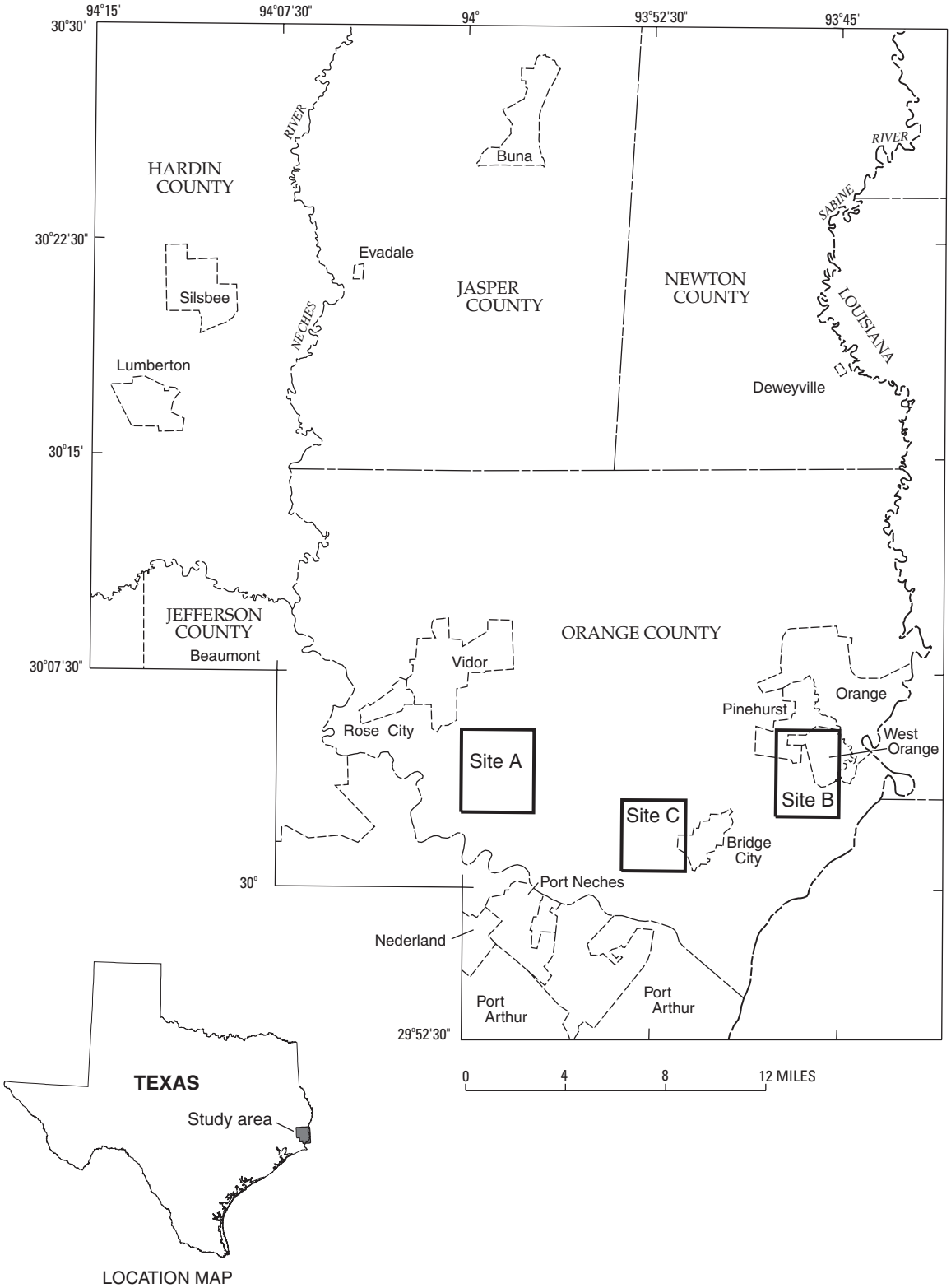


Figure 1. Location of study area.

Purpose and Scope

This report presents a brief discussion on the hydrogeology of the area and an evaluation of the ground-water data collected during April 1985–April 1990. The data include ground-water withdrawals from the Chicot and Evangeline aquifers, water-level altitudes and changes in wells in the Chicot aquifer, and water quality in wells in the Chicot aquifer.

Acknowledgments

Special thanks are extended to the many land owners and industry and city officials who provided data and granted access to water-well sites. Mr. Bill Moltz, Texas Water Development Board, Austin, Texas, tabulated the ground-water withdrawal and surface-water pumpage data used in this report.

Well-Numbering System

The well-numbering system in Texas was developed by the Texas Water Development Board for use throughout the State. Under this system, each 1-degree quadrangle is given a number consisting of two digits. These are the first two digits in the well number. Each 1-degree quadrangle is divided into 7-1/2-minute quadrangles that are given a two-digit number from 01 to 64. These are the third and fourth digits of the well number. Each 7-1/2-minute quadrangle is divided into 2-1/2-minute quadrangles that are given a single-digit number from 1 to 9. This is the fifth digit of the well number. Finally, each well within a 2-1/2-minute quadrangle is given a 2-digit number in the order in which it was inventoried, starting with 01. These are the last two digits of the well number.

In addition to the seven-digit well number, a two-letter prefix is used to identify the county where the well is located. The prefixes for the counties in the study are: Orange, UJ; Hardin, LH; Jasper, PR; Jefferson, PT; and Newton, TZ.

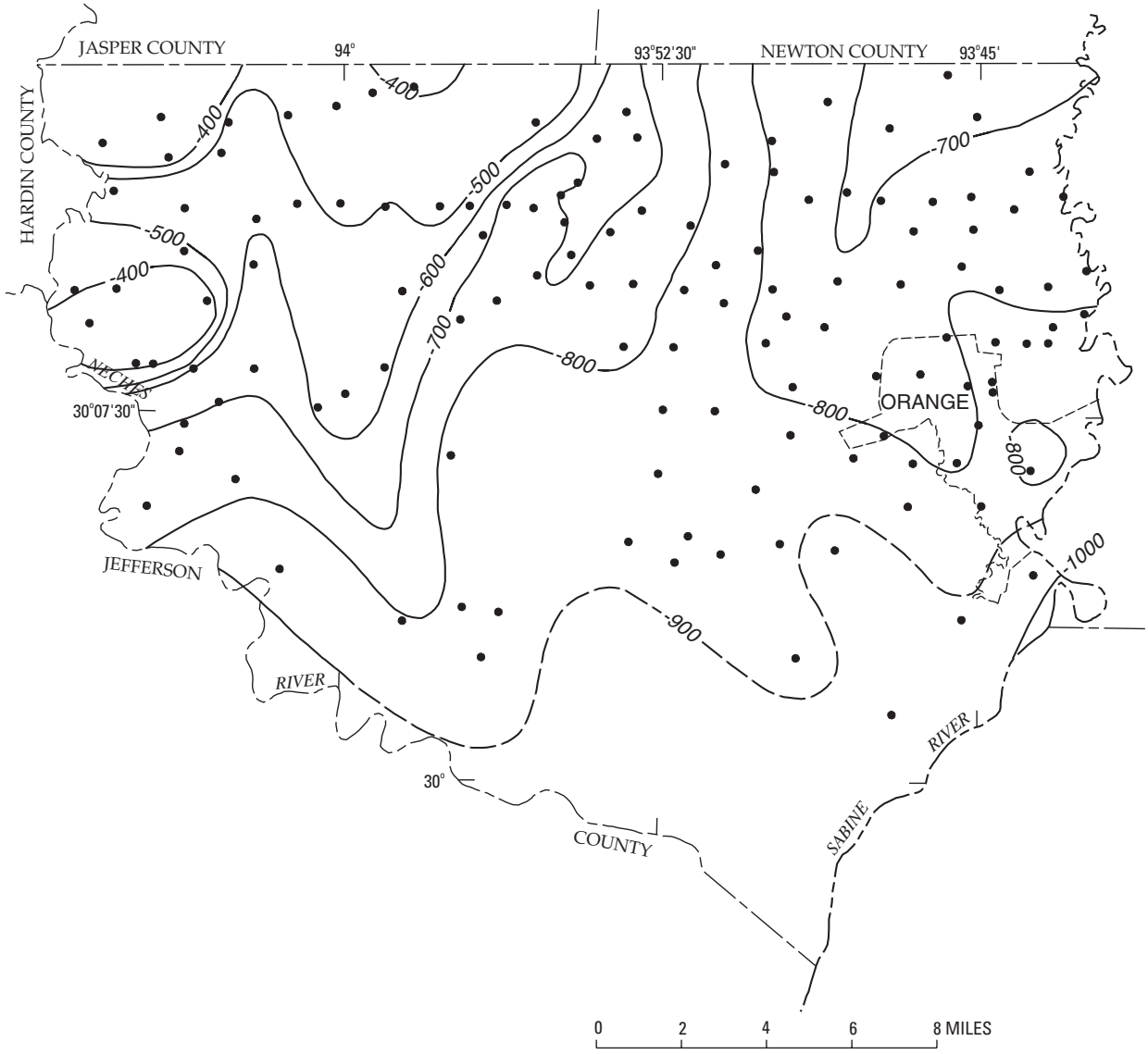
On plate 1, only the last three digits of the well number are shown at each well location where data were collected; the second two digits are shown in the corner of each 7-1/2-minute quadrangle; and the first two digits are shown by the large block numerals adjacent to each 1-degree quadrangle. Plate 1 shows the locations of wells that were inventoried during 1985–90 plus locations of a representative number of wells inventoried during preceding periods.

HYDROGEOLOGY

The hydrologic and geologic units in Orange County have been described by Wesselman (1965), Gabrysch and McAdoo (1972), and Nyman (1984). Harder (1960) and Harder and others (1967) defined the hydrologic units in southwestern Louisiana. This report uses the classification of Nyman (1984) with slight modification. Hydrogeologic correlations for Orange County and adjacent counties are summarized in table 1 (at end of report).

The Chicot aquifer, underlying all of the study area at various depths, stratigraphically is the shallowest principal aquifer in the study area and is of Pleistocene age. The Chicot aquifer is divided into two sand units by clay beds that, although not areally continuous, do separate an upper sand unit from a lower sand unit stratigraphically (table 1). The altitude of the base of the Chicot aquifer ranges from less than 400 ft below sea level in northwestern Orange County to about 1,000 ft below sea level in southeastern Orange County (fig. 2). Electric logs of some wells show a thick high-resistivity sand at the base of the Chicot aquifer, and this sand acts as a well-defined markerbed (Turcan and others, 1966). The lower unit of the Chicot aquifer is a major source of freshwater for Orange County.

The Evangeline aquifer underlies the Chicot aquifer and consists of sediments of Pliocene and Miocene age. The differentiation of the Evangeline aquifer from the Chicot aquifer is made on the basis of grain size. The Evangeline aquifer consists of finer grained sediments than the Chicot aquifer, which consists chiefly of coarse sand and gravel and has a greater sand-to-clay ratio. The sediments of the Evangeline aquifer are less permeable and have lower rates of transmissivity than the Chicot aquifer. Laterally continuous clay beds are not present to separate the two aquifers; this lack of clay beds allows the waters of the aquifers to intermix. The amount of intermixing is dependent on the fluctuating



EXPLANATION

-800 **Structure contour—**Shows altitude of base of Chicot aquifer. Dashed where approximately located. Contour interval 100 feet. Datum is sea level

• **Well used for control**

Figure 2. Approximate altitude of the base of the Chicot aquifer in Orange County, Texas (modified from Gabrysch and McAdoo, 1972).

hydraulic gradient caused by withdrawal at concentrated pumping centers like those at sites A, B, and C (fig. 1). The Evangeline aquifer contains freshwater only in the extreme northwestern part of Orange County.

GROUND-WATER RESOURCES

Withdrawals

Ground-water withdrawals from the lower unit of the Chicot aquifer during 1985–89 were reported by major water users to the Texas Water Development Board. Information on ground-water withdrawals during 1963–84 were published in a previous report (Bonnet and Williams, 1987, p. 13). Average daily rates of ground-water withdrawals from the lower unit of the Chicot aquifer in Orange County during 1980–89 are listed in table 2 (at end of report). The data for 1980–84 are included to indicate historical trends.

The major water users in Orange County did not report any ground-water withdrawals from the upper unit of the Chicot aquifer during 1980–89. Consequently, the withdrawals from this unit are unknown but are believed to be isolated and few.

Average daily rates of ground-water withdrawals for combined municipal and industrial use in Orange County ranged from 13.1 to 20.1 Mgal/d during 1980–89 and ranged from 13.1 to 14.6 Mgal/d during 1985–89. Because of declining economic conditions and recycling of some of the water used for industrial purposes, the average withdrawal of 6.9 Mgal/d during 1985–89 for industrial use was a substantial decrease from the average of 14.4 Mgal/d during 1963–84 (Bonnet and Williams, 1987, table 2). This is in contrast to the average withdrawal of about 6.8 Mgal/d during 1985–89 for municipal use, which was a 1.0 Mgal/d increase over the average of 5.8 Mgal/d during 1963–84 (Bonnet and Williams, 1987, table 2). During 1985–89, withdrawals for municipal use ranged from 6.4 to 7.1 Mgal/d, similar to withdrawals for industrial use, which ranged from 6.4 to 7.5 Mgal/d. The combined municipal and industrial average ground-water withdrawal in 1989 was 13.8 Mgal/d, a substantial decrease from the historical high of 23.1 Mgal/d in 1972 (Bonnet and Williams, 1987, table 2). Most ground water used for industrial purposes was withdrawn at three locations: southeast of the city of Vidor (site A); southwest of the city of Orange, which includes the petrochemical industrial area (site B); and south-central Orange County (site C) (fig. 1). Average daily rates of ground-water withdrawals at these sites during 1980–89 are listed in table 3 (at end of report). The average daily rates of ground-water withdrawals show little year-to-year variability at each location during 1985–89 and were less than the rates during 1980–84.

Surface-water use in Orange County during 1980–89 (table 4 at end of report) was considerably more than ground-water use. Surface water supplied for municipal and industrial use was about 2.5 times the ground-water withdrawals for municipal and industrial use in 1980 and more than 3 times the withdrawals in 1989.

Water for the cities of Beaumont in Jefferson County, Silsbee and Lumberton in Hardin County, and Buna and Evadale in Jasper County is pumped from wells with screened intervals in the Chicot and Evangeline aquifers; therefore, the withdrawal from each individual aquifer is unknown. The estimated ground-water withdrawals during 1985–89 from the Evangeline aquifer and lower unit of the Chicot aquifer for these municipalities are listed in table 5 (at end of report).

Water Levels

Static water-level measurements, used to prepare regional water-level altitude maps, are made in the spring of each year when ground-water withdrawals are minimal (principally as a result of decreased agricultural withdrawals) and when ground-water levels usually are at their highest altitude. Measurements made during 1985–90 are listed in table 6 (at end of report).

Water-level measurements made before 1985 in wells located in the western part of Louisiana adjacent to the Sabine River were used to prepare water-level maps for previous reports (Gabrysch and McAdoo, 1972; Bonnet, 1975; Bonnet and Gabrysch, 1983; and Bonnet and Williams, 1987). Measurements were not made in those wells during 1985–89 because the program that covered this geographic area in Louisiana was discontinued.

Altitudes in April 1990

The approximate altitudes of water levels measured in wells screened in the lower unit of the Chicot aquifer during April 1990 are shown in plate 2. Water levels in wells in Orange County were about 20 to 30 ft below sea level in the central and west-central parts; about 10 to 20 ft below sea level in the northern part; about 30 to more than 40 ft below sea level in the eastern part near the city of Orange; and about 20 to more than 90 ft below sea level in south-central Orange County at site C.

Changes During 1971–90 and 1985–90

Water-level changes during 1971–90 (pl. 3) generally ranged from a decline of more than 20 ft to a rise of more than 10 ft. However, in south-central Orange County, concentrated pumping at site C resulted in estimated declines of more than 10 ft. Water levels in wells rose more than 10 ft south of the city of Orange near the petrochemical industrial area in and near site B. Water levels in wells in Vidor declined as much as 5 ft in the northwestern part of the city, and rose less than 5 ft in the eastern part.

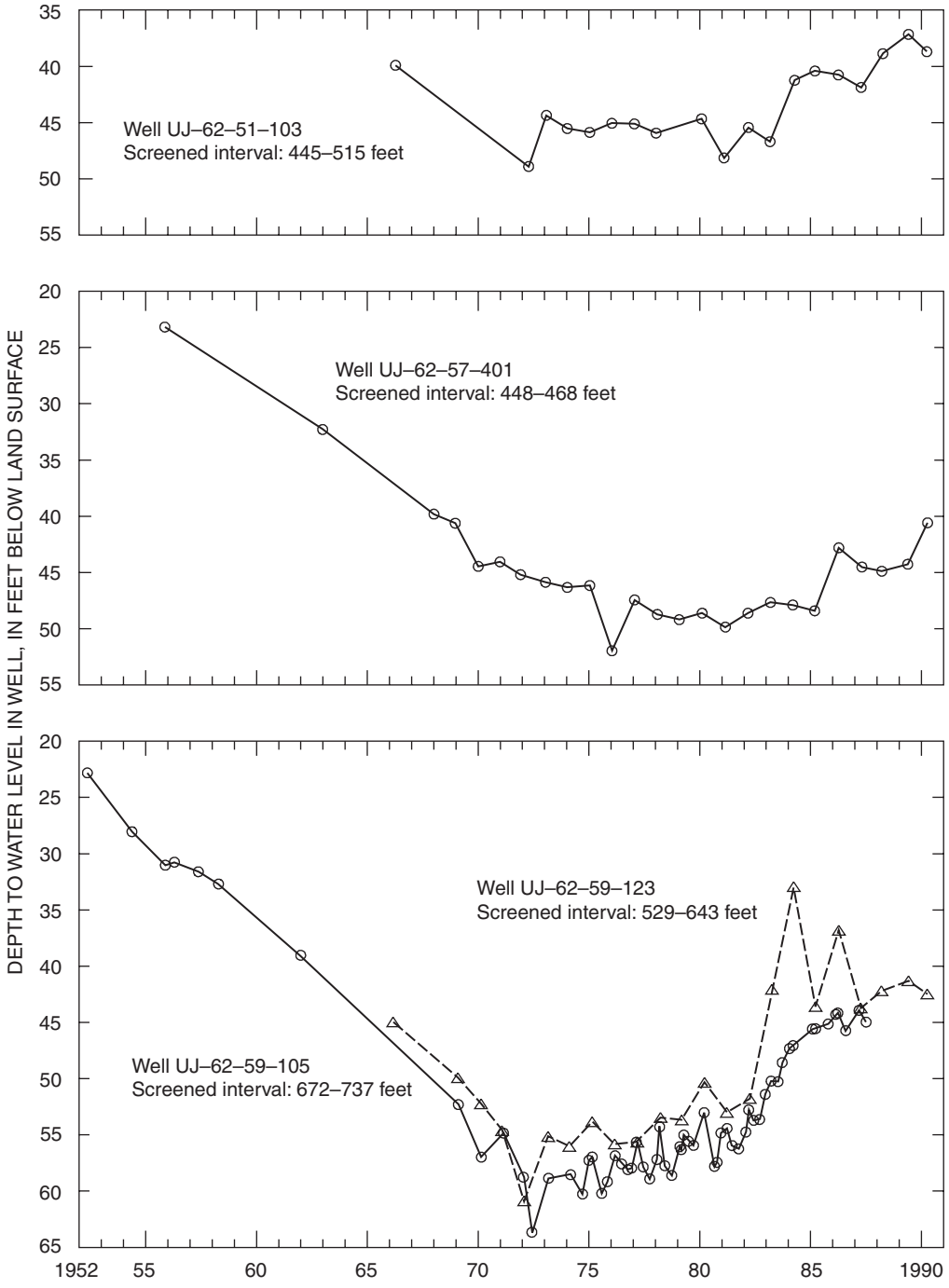
Water-level changes during 1985–90 (pl. 4) ranged from a localized decline of more than 60 ft at site C in south-central Orange County, to a local rise of more than 10 ft in parts of Orange and Pinehurst, north of site B. Water levels generally remained about constant in West Orange and at site B in the petrochemical industrial area. Near Vidor and at site A, water levels in wells rose less than 10 ft. The general rise in water levels during 1985–90 throughout most of Orange County is related to the decrease in withdrawal rates (tables 2 and 3) resulting from the decline in economic conditions and the reuse of some of the ground water pumped for industrial purposes during that period.

Long-term hydrographs of four wells in the study area are shown in figure 3. Well UJ–62–51–103 is located in the northeast corner of Orange County; well UJ–62–57–401 is located in southwestern Orange County; and wells UJ–62–59–105 and UJ–62–59–123 are located in the city of Orange (pl. 1). The hydrographs in figure 3 show declining water levels into the early to mid-1970s, at which time water levels stabilized. In the early 1980s, water levels slowly began to rise. Hydrographs of wells UJ–62–51–103 and UJ–62–57–401 show net water-level rises of about 1.7 and 8 ft, respectively, from 1985 to 1990. The hydrograph of water levels in well UJ–62–59–123 shows a net water-level rise of about 2.4 ft from 1966 to 1990, and the hydrograph of water levels in well UJ–62–59–105, which was discontinued in August 1987, shows a net water-level decline of about 22 ft from 1952 to 1987. The records of selected wells for newly inventoried sites during 1985–90 are presented in table 7 (at end of report). Records of older wells in Orange County and vicinity are given in various previous reports such as Bonnet (1975), Bonnet and Gabrysch (1983), Bonnet and Williams (1987), Gabrysch and McAdoo (1972), McAdoo (1968–70), and Wesselman (1965).

Water Quality

The chemical analyses of water samples collected from selected wells during 1985–90 are listed in table 8 (at end of report). The analyses consisted of specific conductance, pH, temperature (all determined in the field), and dissolved chloride concentration (determined in the laboratory). In 1985 the specific conductance ranged from 180 to 4,140 µS/cm in water from wells UJ–62–49–302 and UJ–62–58–605, respectively. The pH ranged from 6.6 standard units in water from wells UJ–62–50–106 (November 29, 1989) and UJ–62–58–305 (October 27, 1987) to 8.4 standard units in water from well UJ–62–57–401 (December 6, 1989). Water temperature ranged from 18.0 °C in well UJ–62–50–807 on November 29, 1989, to 26.0 °C in well UJ–62–58–608 on October 18, 1988. The dissolved chloride concentrations ranged from 14 mg/L in water collected from well UJ–62–49–905 (November 12, 1985) to 1,200 mg/L in well UJ–62–58–605 (November 14, 1985; November 6, 1986; October 26, 1988). Most of the wells sampled in the lower Chicot aquifer during 1985–89 contained freshwater (dissolved solids concentrations less than 1,000 mg/L (Winslow and Kister, 1956)). Furthermore, dissolved chloride concentrations in water from most wells in the lower Chicot aquifer within the study area showed little variation during 1985–90.

Secondary maximum contaminant levels (SMCL), nonenforceable guidelines based on taste, odor, and color, were established by the U.S. Environmental Protection Agency (1996) for selected properties and constituents in drinking water. pH in samples



NOTE: Points show water levels at time of measurements. Lines between points indicate trend, but actual water levels may have diverged from indicated trends.

Figure 3. Hydrographs showing changes in water levels in wells screened in the lower unit of the Chicot aquifer in Orange County, Texas.

collected during 1985–90 (table 8) from public-supply, livestock, and domestic wells was within the SMCL range of 6.5 to 8.5 standard units. During 1985–90, dissolved chloride concentrations (table 8) in many wells at sites A and B (where the majority of industrial wells are located) were greater than the SMCL of 250 mg/L. However, most of the wells in the northern two-thirds of the county (where the majority of public-supply, livestock, and domestic wells are located) had dissolved chloride concentrations less than 250 mg/L; many of these wells had concentrations less than 100 mg/L.

The geographic distribution of dissolved chloride concentrations in water from wells screened in the lower unit of the Chicot aquifer in Orange County during November–December 1989 is shown in plate 5. Sites A and B, areas with large rates of ground-water withdrawal in Orange County, had the largest dissolved chloride concentrations, ranging from 290 to 740 mg/L, and some of the smallest dissolved chloride concentrations, 20 mg/L at site B and 28 mg/L at site A.

Changes in Dissolved Chloride Concentrations

In coastal areas, many aquifers historically (before development) have contained freshwater and saline water, with the less dense freshwater above the more dense saline water. Ground-water withdrawal can cause mixing of freshwater and saline water within the aquifer depending on numerous factors, the most important being hydrogeologic properties of the aquifer; altitude of the freshwater/saline-water interface; depth of screened intervals in wells; and rate of ground-water withdrawal from wells. A well, or more commonly a site with numerous wells, with a large rate of ground-water withdrawal can cause the saline water to be drawn upward towards the land surface and into the screened interval. This saline-water encroachment causes an increase in the dissolved chloride concentration of the water and can result in saline-water "upconing." Conceptualized profiles of this process are shown in figure 4. This process is indicated when a well (or group of wells) with water having a large dissolved chloride concentration is surrounded by wells (screened at essentially the same interval) with water having smaller dissolved chloride concentrations. The dissolved chloride concentrations in water from several wells at site A were measured in November 1985 (fig. 5). The dissolved chloride concentration in water from well UJ–62–57–404 was substantially greater than concentrations from five of the wells surrounding it, indicating upconing at this site.

Saline-water encroachment is shown by data at site B near the city of Orange (fig. 6). The dissolved chloride concentrations in water from wells located at site B ranged from 14 mg/L in the central part of the site in 1972 to 1,500 mg/L in the southwestern part in 1974 (Bonnet, 1975, table 3). During 1985–89, dissolved chloride concentrations ranged from 21 mg/L in water from well UJ–62–58–642 in the central part of site B to 1,200 mg/L in water from well UJ–62–58–605 in the southwestern part of site B (table 8).

The steepness of the slope of the freshwater/saline-water interface is shown by dissolved chloride concentrations in water from two wells, UJ–62–58–605 and UJ–62–58–635, located within 0.2 mi of each other (fig. 6). The wells are screened at comparable depths and yielded water in November 1985 with dissolved chloride concentrations of 1,200 and 34 mg/L, respectively (fig. 6a). The concentrations of dissolved chloride in water from these two wells were 1,200 and 34 mg/L, respectively, in November 1986 (fig. 6b) and 1,100 and 31 mg/L, respectively, in November 1987 (table 8). Samples for chemical analyses were not collected from well UJ–62–58–635 in 1988 or 1989.

To mitigate the effects of saline-water encroachment, ground-water users in areas of Orange County with large rates of ground-water withdrawal and subsequent elevated dissolved chloride concentrations used the following techniques: alternating pumping between available wells; carefully monitoring withdrawal rates, specific conductivities, and dissolved chloride concentrations; supplementing ground-water withdrawals with surface-water pumpage; and recycling the water used for industrial purposes.

Relation Between Specific Conductance and Dissolved Chloride Concentrations

A generalized relation between specific conductance and dissolved chloride concentration in water from wells screened in the lower unit of the Chicot aquifer in Orange County and sampled during 1985–89 is

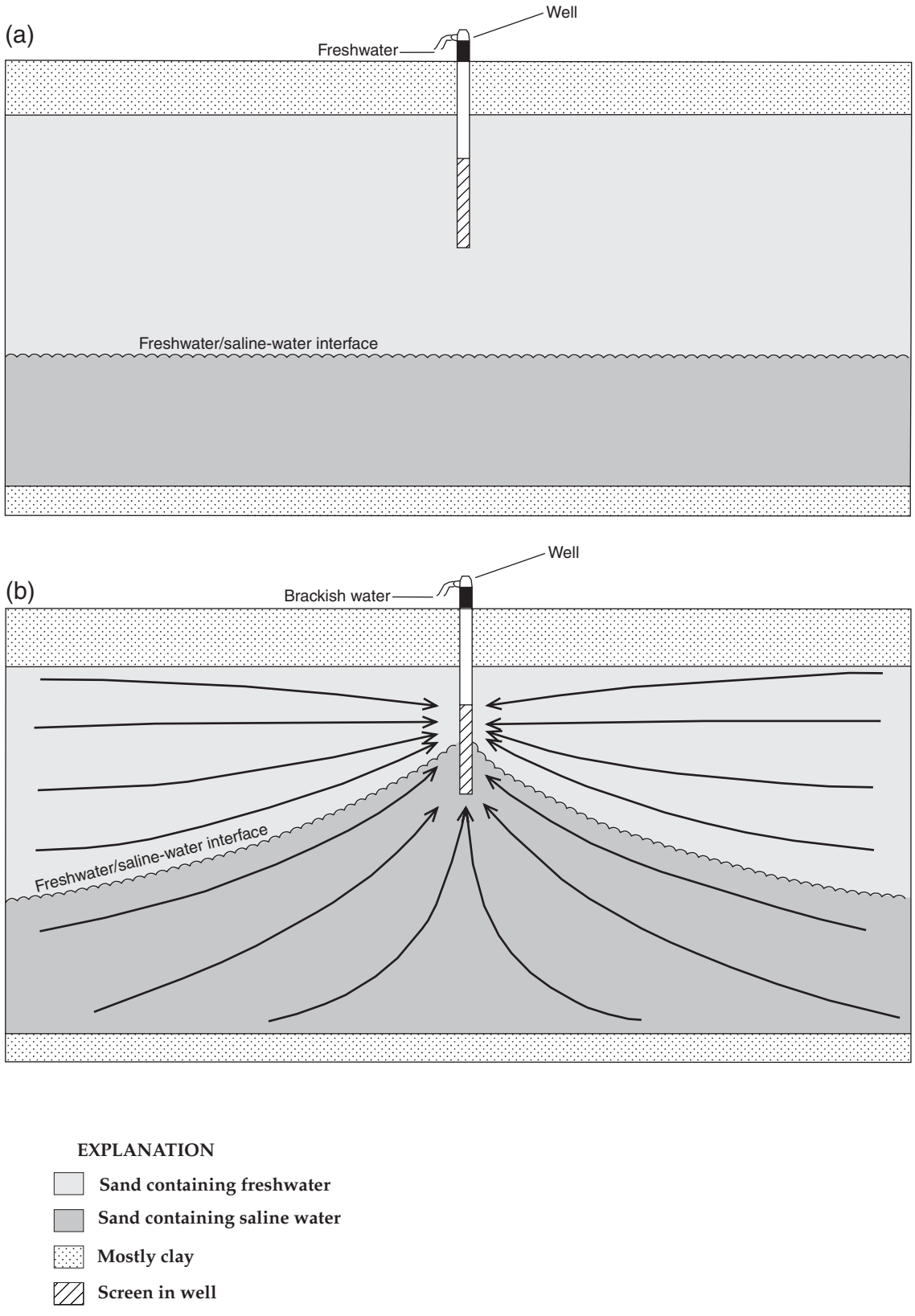


Figure 4. Conceptual profiles showing (a) relation between freshwater and saline water before pumping begins and (b) development of a saline-water cone during pumping (modified from Nyman, 1984).

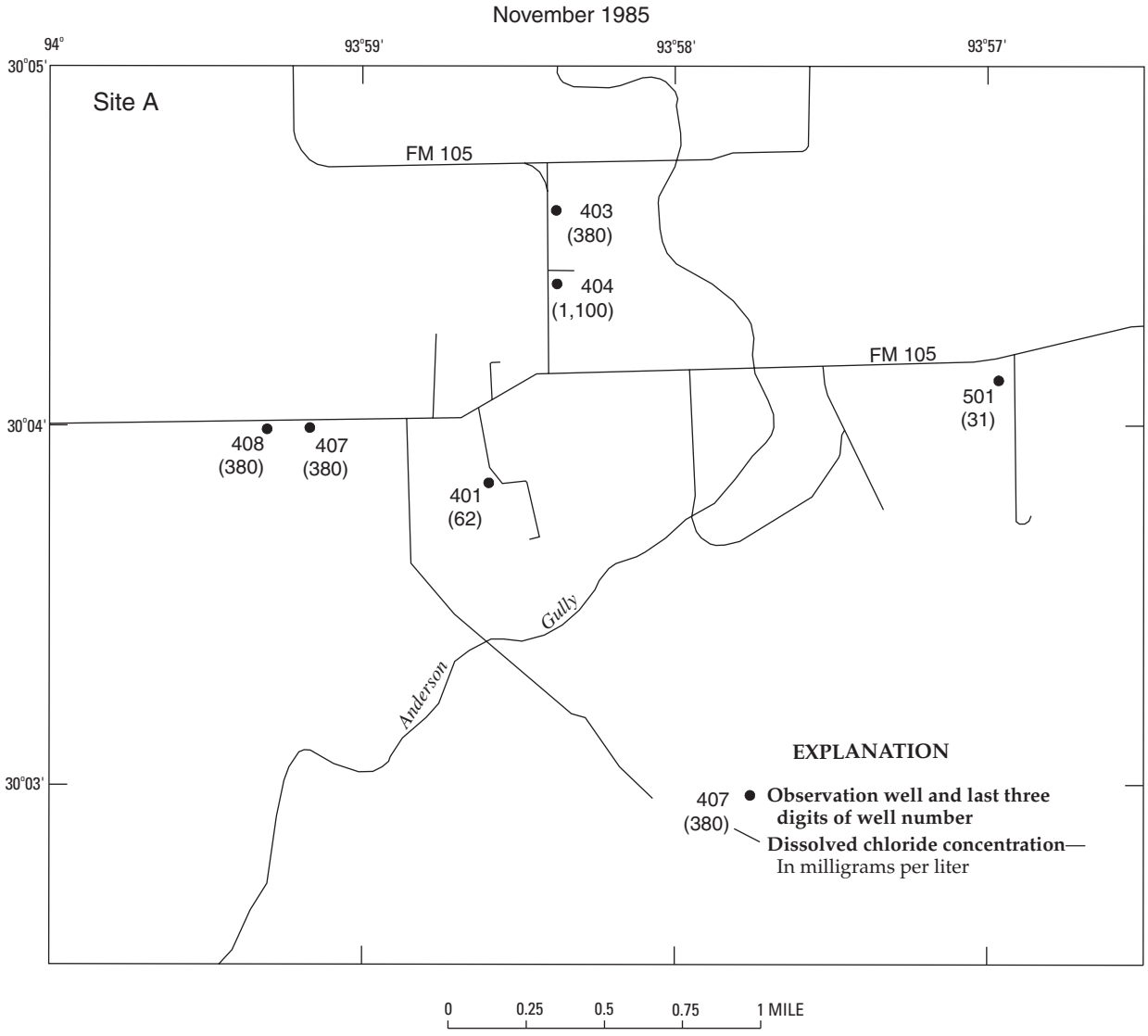


Figure 5. Dissolved chloride concentrations in water from selected wells screened in the lower unit of the Chicot aquifer at site A in southwestern Orange County, Texas, November 1985.

shown in figure 7. A statistical linear regression was used to determine a line that best fit all data using the equation:

Dissolved chloride concentration = (3.1759) specific conductance + 325.2591.

As shown by figure 7, the relation between these two constituents is approximately linear when specific conductances range between 800 and 2,500 µS/cm. The plot also shows that the equation is less accurate and the relation becomes nonlinear when specific conductances are less than 800 µS/cm or greater than 2,500 µS/cm. The nonlinear relations are probably caused by concentrations of other dissolved ions in the ground water and also by the greater density of data values in the mid to lower range. This relation is applicable only for samples collected in Orange County. Because specific-conductance measurements can be made easily and inexpensively at the well site, the relation shown can be used to determine approximate concentrations of dissolved chloride.

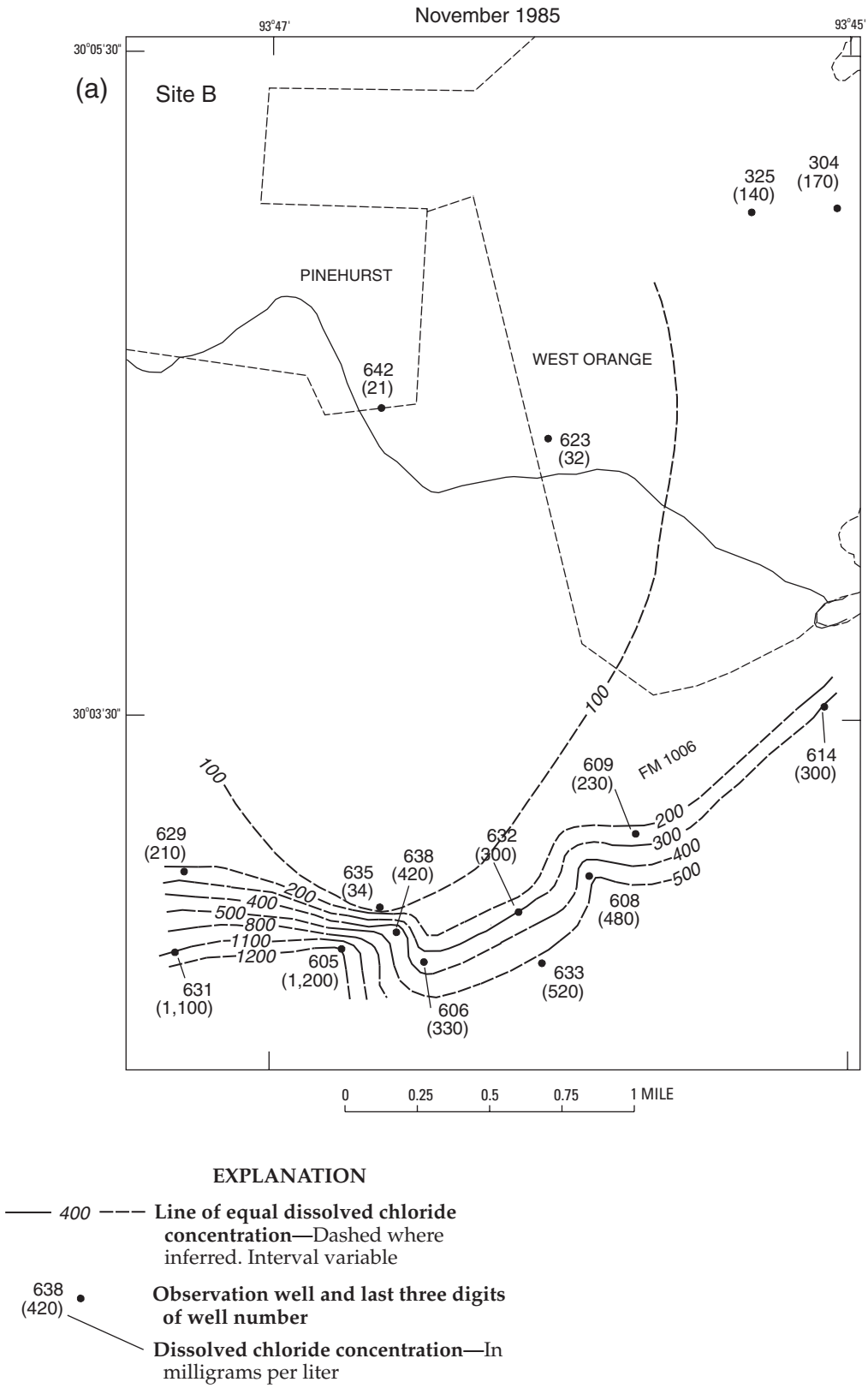
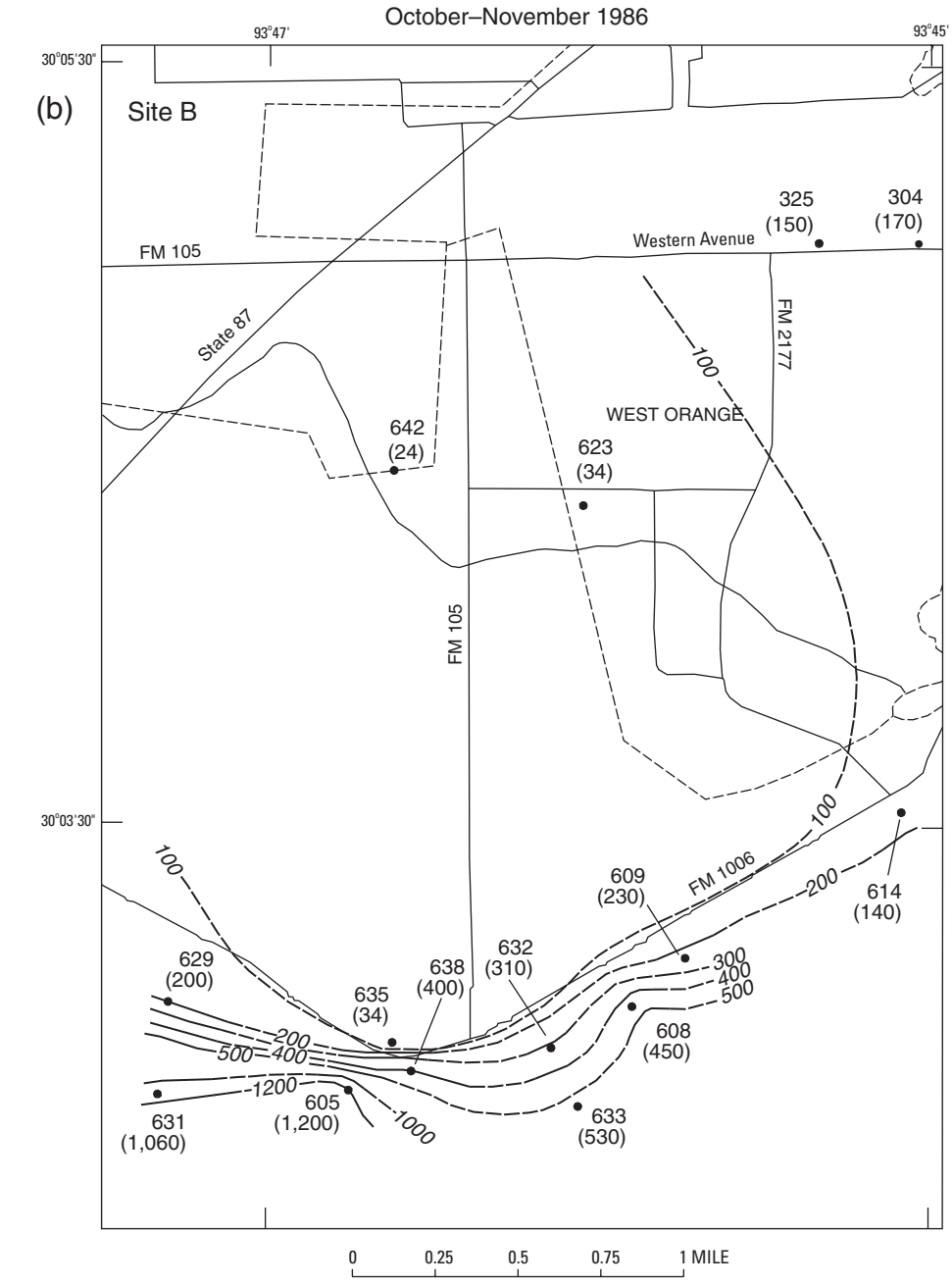


Figure 6. Dissolved chloride concentrations in water from selected wells screened in the lower unit of the Chicot aquifer at Site B in southeastern Orange County, Texas, (a) November 1985, (b) October–November 1986, and (c) October 1988.



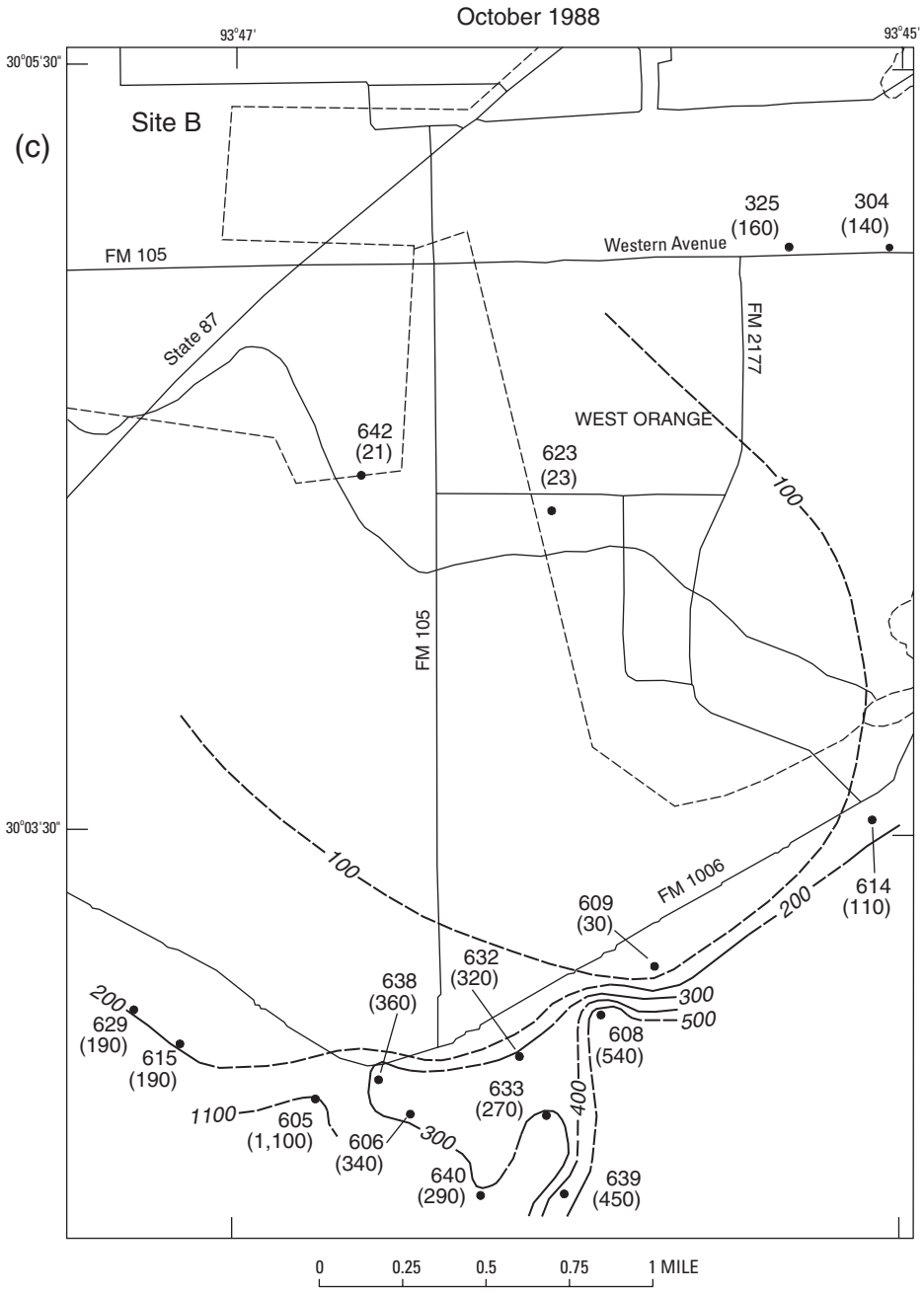
EXPLANATION

400 **Line of equal dissolved chloride concentration**—Dashed where inferred. Interval variable

638 (400) **Observation well and last three digits of well number**

Dissolved chloride concentration—In milligrams per liter

Figure 6.—Continued.



EXPLANATION

Line of equal dissolved chloride concentration—Dashed where inferred. Interval, in feet, is variable

Observation well and last three digits of well number

Dissolved chloride concentration—In milligrams per liter

Figure 6.—Continued.

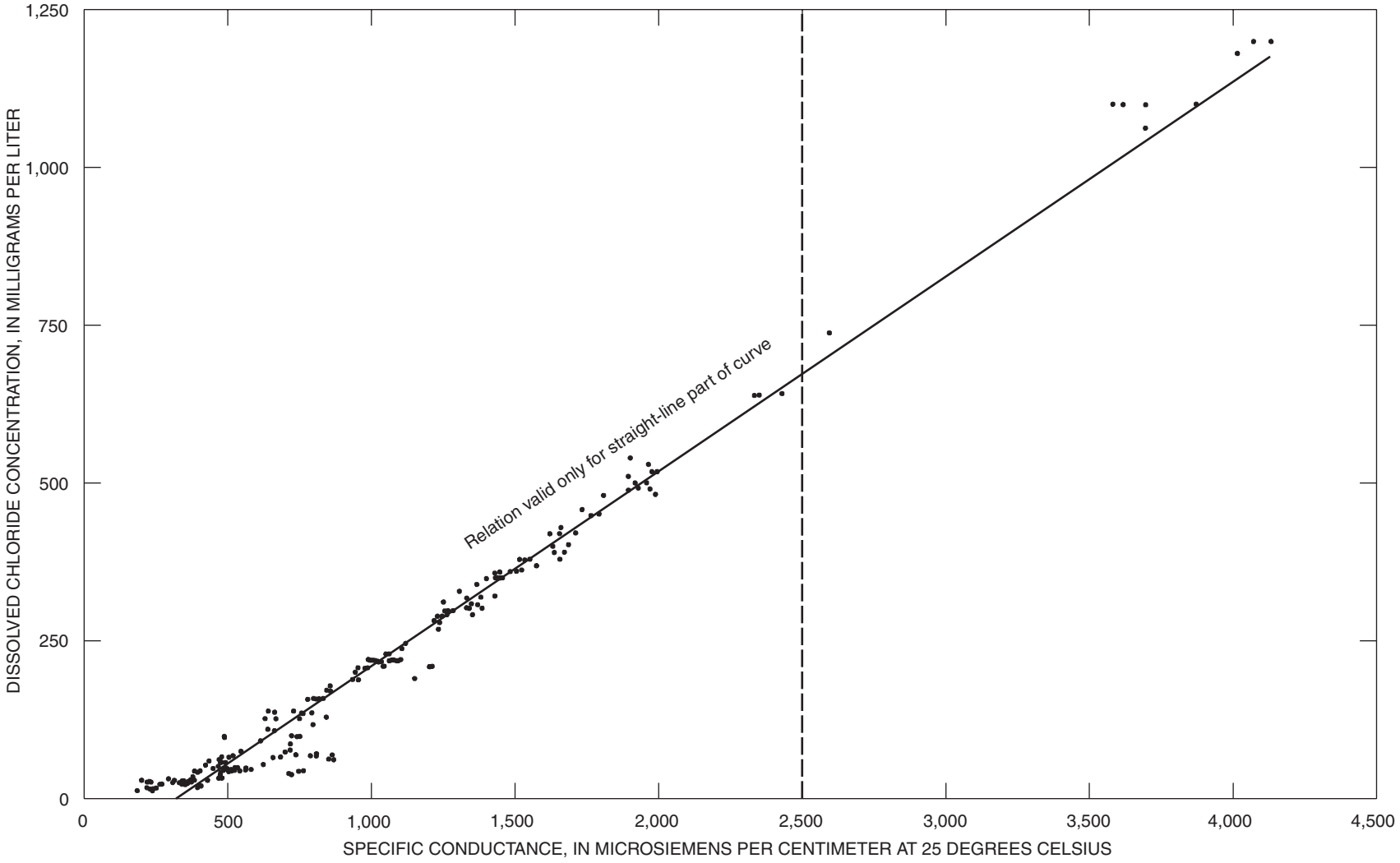


Figure 7. Relation between specific conductance and dissolved chloride concentrations in water from wells screened in the lower unit of the Chicot aquifer, Orange County, Texas, 1985–89.

SUMMARY

The lower unit of the Chicot aquifer is a major source of freshwater for Orange County, Texas. The lower unit of the aquifer, separated from the upper unit by clay beds, is Pleistocene in age and underlies all of the study area at varying depths. The altitude of the base of the aquifer ranges from less than 400 ft below sea level in northwestern Orange County to about 1,000 ft below sea level in southeastern Orange County.

In 1989, the average rate of ground-water withdrawals from the lower unit of the Chicot aquifer in Orange County for combined municipal and industrial use was 13.8 Mgal/d, a substantial decrease from the historical high of 23.1 Mgal/d in 1972. Average annual withdrawals for municipal and industrial use were similar for 1985–89, ranging from 13.1 to 14.6 Mgal/d. The average withdrawal for industrial use decreased substantially from 14.4 Mgal/d during 1963–84 to 6.9 Mgal/d during 1985–89. The average withdrawal for municipal use during 1985–89 was 6.8 Mgal/d, similar to the average withdrawal of 5.8 Mgal/d during 1963–84.

Water levels in wells in most of the study area rose during 1985–90 because of decreased ground-water withdrawal associated with declining economic conditions and recycling of some of the water used for industrial purposes during that period. The largest rise in water levels was more than 10 ft in parts of Orange and Pinehurst, north of site B, while the largest decline in water levels was a localized decline of more than 60 ft at site C in south-central Orange County.

Chemical analyses of ground-water samples from the lower Chicot aquifer during 1985–90 indicate that the aquifer contained mostly freshwater (dissolved solids concentrations less than 1,000 mg/L). Dissolved chloride concentrations in most wells within the study area remained relatively constant during 1985–90. However, the distribution of dissolved chloride showed that, in some areas, concentrations could vary greatly between wells within short distances. The data also indicate that the saline-water encroachment, primarily by saline-water upconing, continued to occur during 1985–89, but in smaller dissolved chloride concentrations and at a slower rate compared to the 1970s and early 1980s. To mitigate the effects of saline-water encroachment, ground-water users in areas with large rates of ground-water withdrawal and large dissolved chloride concentrations used the following techniques: alternating pumping between available wells; carefully monitoring withdrawal rates, specific conductivities, and dissolved chloride concentrations; supplementing ground-water withdrawals with surface-water pumpage; and recycling the water used for industrial purposes.

On the basis of chemical data collected during 1985–89, a relation was determined between specific conductance and dissolved chloride concentration that can be used to estimate dissolved chloride by multiplying the specific conductance by different factors for low or high conductances.

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GLOSSARY

Aquifer—A formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield substantial quantities of water to wells and springs.

Confining unit—A body of markedly less permeable material, stratigraphically adjacent to one or more aquifers, that confines water in the aquifer so that the water level rises above the base of the confining unit.

Freshwater—Variously defined as water containing less than 1,000 mg/L dissolved solids or water containing 250 mg/L or less dissolved chloride. In this report, freshwater is defined as water having a dissolved solids concentration of 250 mg/L or less.

Freshwater/saline-water interface—The boundary surface between two fluids of different density; the boundary is the sloping surface between freshwater and saline water in this report.

Saline water—Water with a dissolved solids concentration equal to or greater than 1,000 mg/L. Four classes of saline water have been defined by Winslow and Kister (1956) according to the concentrations of dissolved solids: (1) slightly saline, 1,000 to 3,000 mg/L; (2) moderately saline, 3,000 to 10,000 mg/L; (3) very saline, 10,000 to 35,000 mg/L; and (4) brine, greater than 35,000 mg/L.

Saline-water upconing (or vertical intrusion)—A phenomenon caused when two fluids with different densities at dynamic equilibrium are made dynamically unstable by withdrawal by pumping of the upper or less dense fluid.

Saline-water encroachment (or intrusion)—The phenomenon occurring when a body of saline water, because of its greater density or hydraulic head, encroaches (or intrudes) into a body of freshwater.

Table 1. Hydrogeologic correlations for Orange County and adjacent counties, Texas

[Modified from Nyman (1984, table 1)]

<table>
<tr><th rowspan="2">System</th><th rowspan="2">Series</th><th>Harder (1960)</th><th>Harder and others (1967)</th><th>Wesselman (1965)</th><th colspan="2">Wesselman (1971)</th><th>This report</th></tr>
<tr><th colspan="6">Hydrologic unit</th></tr>
<tr><td rowspan="6">QUATERNARY</td><td>Holocene</td><td></td><td></td><td rowspan="2">Upper aquifer</td><td rowspan="3">Upper unit of Chicot aquifer</td><td rowspan="6">Chicot aquifer</td><td></td></tr>
<tr><td rowspan="5">Pleistocene</td><td rowspan="2">Chicot shallow</td><td rowspan="2">Shallow sand</td><td rowspan="2">Upper unit of Chicot aquifer</td></tr>
<tr><td rowspan="2">“200-foot” sand</td><td rowspan="2">Upper sand unit</td></tr>
<tr><td>Clay beds</td><td>Clay beds</td></tr>
<tr><td>“500-foot” sand</td><td rowspan="2">Undifferentiated lower sand unit</td><td rowspan="2">Middle aquifer</td><td rowspan="2">Lower unit of Chicot aquifer</td><td rowspan="2">Lower unit of Chicot aquifer</td></tr>
<tr><td>“700-foot” sand</td></tr>
<tr><td rowspan="2">TERTIARY</td><td>Pliocene</td><td>Evangeline aquifer</td><td>Evangeline aquifer</td><td>Lower aquifer</td><td colspan="2">Evangeline aquifer</td><td>Evangeline aquifer</td></tr>
<tr><td>Miocene</td><td></td><td></td><td></td><td colspan="2">Burkeville confining unit</td><td></td></tr>
</table>

Table 2. Average daily rates of ground-water withdrawals for municipal and industrial use from the lower unit of the Chicot aquifer in Orange County, Texas, 1980–89, in million gallons per day

[Data for 1980–84 from Bonnet and Williams, 1987]

Year	Municipal use	Industrial use	Total use
1980	7.5	12.2	19.7
1981	7.3	12.8	20.1
1982	7.4	10.3	17.7
1983	7.2	8.9	16.1
1984	7.0	8.2	15.2
1985	6.7	6.4	13.1
1986	6.5	6.7	13.2
1987	6.4	7.2	13.6
1988	7.1	7.5	14.6
1989	7.1	6.7	13.8

Table 3. Average daily rates of ground-water withdrawals from the lower unit of the Chicot aquifer at major industrial sites in Orange County, Texas, 1980–89, in million gallons per day

[Data for 1980–84 from Bonnet and Williams, 1987]

Year	Site A	Site B	Site C	Total
1980	3.9	6.4	1.9	12.2
1981	4.2	6.4	2.2	12.8
1982	3.4	4.7	2.2	10.3
1983	2.2	4.5	2.2	8.9
1984	1.4	4.9	1.9	8.2
1985	.5	3.8	1.2	5.5
1986	.5	3.6	1.5	5.6
1987	.6	3.8	1.7	6.1
1988	.7	4.0	1.5	6.2
1989	.7	3.8	1.3	5.8

Table 4. Average daily rates of surface water supplied for municipal and industrial use in Orange County, Texas, 1980–89, in million gallons per day

[Data tabulated by Bill Moltz, Texas Water Development Board. --, data not available]

Year	Municipal	Industrial	Total
1980	--	--	48.6
1981	--	--	58.1
1982	--	--	38.0
1983	--	--	36.5
1984	--	--	41.4
1985	0.1	37.1	37.2
1986	.1	39.4	39.5
1987	.1	42.3	42.4
1988	.1	46.5	46.6
1989	.1	45.1	45.2

Table 5. Average daily rates of ground-water withdrawals from the Evangeline aquifer and lower unit of the Chicot aquifer for public supply in eastern Jefferson, eastern Hardin, and southern Jasper Counties, Texas, 1985–89, in million gallons per day

[Data tabulated by Bill Moltz, Texas Water Development Board]

User	1985	1986	1987	1988	1989
Beaumont, Jefferson County	9.8	8.4	7.3	7.2	7.0
Silsbee, Hardin County	1.0	.9	.9	.9	1.0
Lumberton Municipal Utility District, Hardin County	.9	.8	.8	.9	.9
Buna, Jasper County	.2	.2	.3	.3	.3
Evadale, Jasper County	.1	.3	.1	.1	.1
Totals:	12.0	10.6	9.4	9.4	9.3

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90

Owner : WCID, Water Control and Improvement District; CSD, Consolidated School District; Util., Utility; ISD, Independent School District; MUD, Municipal Utility District
Depth : Total depth of well
Screen : Top and bottom of screened interval
Altitude : Altitude of land surface datum above sea level
Water level : Feet below land surface

Orange County

Well UJ–61–56–103
Owner: B.H. Thibodeau
Depth: 76 feet
Altitude: 23 feet

Date	Water level
04–15–85	11.09
04–28–86	12.15
05–11–87	11.08
04–11–88	11.61
05–31–89	11.43
11–27–89	14.18
04–16–90	11.68

Well UJ–61–56–314
Owner: G.C. Hinch
Screen: 375–385 feet
Altitude: 27 feet

Date	Water level
04–15–85	44.20
04–28–86	43.84
04–22–87	42.77
04–11–88	42.34
05–31–89	42.16
11–27–89	43.00
04–16–90	41.47

Well UJ–61–56–315
Owner: Iwanda Trailer Park
Screen: 356–380 feet
Altitude: 26 feet

Date	Water level
04–15–85	44.37
04–28–86	44.20
04–22–87	42.31
04–11–88	41.88
05–31–89	41.52
04–17–90	42.19

Well UJ–61–56–611
Owner: Larry Brewer
Screen: 441–457 feet
Altitude: 22 feet

Date	Water level
04–18–90	46.90

Well UJ–61–56–901
Owner: Orange County WCID 1, well 2
Screen: 350–400 feet
Altitude: 21 feet

Date	Water level
04–09–85	50.65
05–02–86	47.42
05–11–87	46.24
04–18–88	47.28
05–31–89	46.76
04–17–90	45.73

Well UJ–61–56–911
Owner: Community Water System
Screen: 468–486 feet
Altitude: 12 feet

Date	Water level
04–18–90	37.94

Well UJ–61–56–919
Owner: Orange County WCID 1, well 3
Screen: 385–420 feet
Altitude: 21 feet

Date	Water level
04–09–85	49.84
05–01–86	49.73
05–11–87	49.06
04–18–88	49.76
05–31–89	49.15
04–17–90	46.66

Well UJ–61–56–920
Owner: Orange County WCID 1, Wexford Park
Depth: 380 feet
Altitude: 11 feet

Date	Water level
04–15–85	47.54
05–02–86	48.87
04–22–87	45.64
05–31–89	44.30
04–18–90	45.92

Well UJ–61–56–922
Owner: Orange County WCID 1, well 4
Screen: 284–490 feet
Altitude: 26 feet

Date	Water level
04–09–85	58.24
04–17–90	51.09

Well UJ–61–56–923
Owner: Orange County WCID 1, Tiger Lake
Screen: 430–460 feet
Altitude: 16 feet

Date	Water level
04–18–90	45.33

Well UJ–62–49–503
Owner: G.L. Linscomb
Depth: 117 feet
Altitude: 26 feet

Date	Water level
04–08–85	8.74
04–29–86	11.16
04–22–87	9.46
04–18–88	9.41
05–31–89	8.98
04–17–90	9.23

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Well UJ–62–49–804
Owner: Parkview Subdivision
Screen: 470–490 feet
Altitude: 14 feet

Date	Water level
04–17–90	38.55

Well UJ–62–49–904
Owner: Texas Department of Transportation
Screen: 399–415 feet
Altitude: 16 feet

Date	Water level
04–30–86	39.45
05–12–87	38.75
04–18–90	37.75

Well UJ–62–50–107
Owner: Mauriceville Water Supply Corp., well 4
Screen: 680–730 feet
Altitude: 26 feet

Date	Water level
04–28–90	[1]38

[1] Reported by well owner.

Well UJ–62–50–201
Owner: Boyce N. Ward
Screen: 476–586 feet
Altitude: 26 feet

Date	Water level
04–08–85	44.12
04–29–86	43.36
04–22–87	40.02
04–18–88	41.62
05–31–89	41.24
04–18–90	45.03

Well UJ–62–50–807
Owner: Henry L. Wilson
Screen: 442–454 feet
Altitude: 20 feet

Date	Water level
04–09–85	46.60
05–05–86	46.37
05–13–87	43.65
04–19–88	42.86
05–31–89	42.52
04–18–90	42.65

Well UJ–62–50–808
Owner: H.D. Womack
Screen: 643–655 feet
Altitude: 20 feet

Date	Water level
04–09–85	48.15
05–05–86	47.31
05–13–87	46.36
04–19–88	45.11
05–31–89	44.55
04–18–90	45.40

Well UJ–62–50–911
Owner: City of Orange, well 9
Screen: 454–618 feet
Altitude: 12 feet

Date	Water level
04–10–85	44.10
04–21–87	40.56
04–23–90	41.97

Well UJ–62–50–912
Owner: Little Cypress-Mauriceville CSD
Screen: 460–510 feet
Altitude: 16 feet

Date	Water level
05–12–87	48.0

Well UJ–62–51–103
Owner: Inland-Orange Inc.
Screen: 445–515 feet
Altitude: 25 feet

Date	Water level
04–09–85	40.71
05–08–86	41.15
05–13–87	42.28
04–18–88	39.25
06–05–89	37.52
04–18–90	39.04

Well UJ–62–51–104
Owner: Inland-Orange Inc.
Screen: 460–470 feet
Altitude: 24 feet

Date	Water level
04–18–90	41.54

Well UJ–62–51–707
Owner: J.M. Huber Co.
Screen: 428–488 feet
Altitude: 12 feet

Date	Water level
04–09–85	46.52
05–08–86	42.70
04–22–87	44.42
04–18–88	42.08
06–06–89	39.74
04–19–90	42.29

Well UJ–62–57–203
Owner: Joe M. Heinen
Depth: 740 feet
Altitude: 18 feet

Date	Water level
04–09–85	45.31
05–02–86	46.43
04–21–87	45.87
04–12–88	45.46
06–06–89	45.02
04–18–90	42.33

Well UJ–62–57–401
Owner: Texas Eastern Gas Pipeline Co.
Screen: 448–468 feet
Altitude: 16 feet

Date	Water level
04–11–85	48.84
04–30–86	43.09
05–14–87	44.80
04–13–88	45.22
06–06–89	44.55
04–19–90	40.91

Well UJ–62–57–403
Owner: Gulf States Util. Co., Vidor, well 1
Screen: 433–483 feet
Altitude: 15 feet

Date	Water level
04–09–85	42.89
04–29–86	43.14
04–12–88	41.30
06–02–89	39.95
04–20–90	40.53

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Well UJ–62–57–404
Owner: Gulf States Util. Co., Vidor, well 2
Screen: 430–481 feet
Altitude: 16 feet

Date	Water level
04–09–85	44.90
04–20–87	41.04
04–12–88	40.88
06–02–89	40.82
04–19–90	42.14

Well UJ–62–57–405
Owner: Gulf States Util. Co., Vidor, well 3
Screen: 430–480 feet
Altitude: 18 feet

Date	Water level
04–09–85	46.20
04–29–86	44.84
04–20–87	43.78
04–12–88	44.81
06–02–89	39.70
04–19–90	42.14

Well UJ–62–57–406
Owner: Gulf States Util. Co., Vidor, well 6
Screen: 430–480 feet
Altitude: 15 feet

Date	Water level
04–09–85	44.82
04–29–86	41.43
04–20–87	38.85
11–22–89	35.40
04–19–90	35.93

Well UJ–62–57–407
Owner: Gulf States Util. Co., Vidor, well 4
Screen: 320–370 feet
Altitude: 6 feet

Date	Water level
04–09–85	30.60
04–29–86	27.30
04–20–87	21.58
06–02–89	4.69
04–19–90	3.84

Well UJ–62–57–408
Owner: Gulf States Util. Co., Vidor, well 5
Screen: 343–383 feet
Altitude: 6 feet

Date	Water level
04–09–85	31.36
04–29–86	27.93
04–20–87	25.59
04–12–88	24.69
06–02–89	22.23
04–19–90	26.22

Well UJ–62–57–409
Owner: Ted B. Michael
Screen: 550–640 feet
Altitude: 13 feet

Date	Water level
04–09–85	43.05
04–29–86	42.54
05–14–87	41.68
04–12–88	42.65
06–02–89	41.07
04–20–90	40.40

Well UJ–62–57–501
Owner: Enron Gas Pipeline Operating Co.
Screen: 405–435 feet
Altitude: 16 feet

Date	Water level
04–09–85	41.60
05–02–86	40.24
04–21–87	41.14
04–12–88	40.17
06–02–89	38.81

Well UJ–62–57–904
Owner: Gulf States Util. Co., Sabine, well 4
Screen: 432–455 feet
Altitude: 10 feet

Date	Water level
05–13–87	88.23
04–20–90	97.65

Well UJ–62–57–905
Owner: Gulf States Util. Co., Sabine, well 5
Screen: 422–461 feet
Altitude: 8 feet

Date	Water level
04–20–90	98.46

Well UJ–62–57–907
Owner: Gulf States Util. Co., Sabine, well 7
Screen: 604–654 feet
Altitude: 10 feet

Date	Water level
05–13–87	46.76
04–20–90	37.30

Well UJ–62–57–908
Owner: Gulf States Util. Co., Sabine, well 8
Screen: 573–623 feet
Altitude: 10 feet

Date	Water level
04–16–85	41.25
05–08–86	41.11
04–20–90	35.72

Well UJ–62–57–909
Owner: Gulf States Util. Co., Sabine, well 9
Screen: 410–460 feet
Altitude: 10 feet

Date	Water level
04–20–90	106.42

Well UJ–62–58–208
Owner: J.M. Huber Plastics, well 2
Screen: 509–539 feet
Altitude: 14 feet

Date	Water level
07–01–89	[1]50

[1] Reported by well owner.

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Well UJ–62–58–304
Owner: Orange County WCID 2, well 1
Screen: 626–706 feet
Altitude: 10 feet

Date	Water level
04–10–85	47.70
04–30–86	41.33
04–21–87	49.14
04–12–88	47.62
04–23–90	47.38

Well UJ–62–58–305
Owner: City of Orange, well 8
Screen: 520–610 feet
Altitude: 11 feet

Date	Water level
04–10–85	51.36
05–01–86	44.31
04–21–87	46.11
04–21–88	43.72
06–05–89	41.13
04–23–90	43.93

Well UJ–62–58–324
Owner: City of Pinehurst, well 1
Screen: 365–445 feet
Altitude: 14 feet

Date	Water level
04–10–85	56.73
05–01–86	52.12
05–14–87	44.58
04–21–88	43.15
06–05–89	41.60
04–24–90	46.24

Well UJ–62–58–325
Owner: Orange County WCID 2, well 2
Screen: 620–670 feet
Altitude: 12 feet

Date	Water level
04–10–85	44.97
04–30–86	47.18
04–21–87	51.78
04–12–88	49.25
06–05–89	47.40
04–23–90	45.03

Well UJ–62–58–326
Owner: City of Pinehurst, well 2
Screen: 530–600 feet
Altitude: 14 feet

Date	Water level
04–24–90	45.10

Well UJ–62–58–403
Owner: Orangefield ISD
Screen: 460–480 feet
Altitude: 15 feet

Date	Water level
04–09–85	43.03
04–30–86	43.48
04–20–87	43.70
04–12–88	44.15
06–05–89	44.02
04–24–90	44.05

Well UJ–62–58–410
Owner: Orangefield Recreation Park
Screen: 110–120 feet
Altitude: 5 feet

Date	Water level
04–09–85	7.70
04–30–86	4.14
04–20–87	4.02
04–12–88	3.07
04–24–90	3.24

Well UJ–62–58–514
Owner: Doan's Nursery
Depth: 400 feet
Altitude: 8 feet

Date	Water level
04–19–90	7.44

Well UJ–62–58–515
Owner: Doan's Nursery
Depth: 275 feet
Altitude: 8 feet

Date	Water level
04–19–90	10.20

Well UJ–62–58–602
Owner: Ernest H. Willey
Depth: 711 feet
Altitude: 14 feet

Date	Water level
04–10–85	50.10
04–30–86	47.97
05–12–87	48.15
04–12–88	40.65
05–31–89	40.38
04–24–90	12.51

Well UJ–62–58–603
Owner: W.H. Stark Estate
Depth: 204 feet
Altitude: 8 feet

Date	Water level
04–10–85	10.53
05–05–86	10.57
05–12–87	11.12
04–13–88	9.71
05–31–89	9.90
04–24–90	9.57

Well UJ–62–58–605
Owner: Chevron Chemical Co., well 4
Screen: 604–717 feet
Altitude: 7 feet

Date	Water level
04–11–85	51.88
04–25–90	49.99

Well UJ–62–58–606
Owner: James River Corp., well 3
Screen: 630–710 feet
Altitude: 7 feet

Date	Water level
04–24–90	42.90

Well UJ–62–58–608
Owner: Allied-Signal Inc.
Screen: 620–735 feet
Altitude: 8 feet

Date	Water level
04–10–85	47.00
04–30–86	43.48
04–21–87	51.60
04–12–88	44.53
05–31–89	43.14
04–24–90	45.74

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Well UJ–62–58–609
Owner: E.I. DuPont Co., well 103–3
Screen: 634–723 feet
Altitude: 11 feet

Date	Water level
04–12–85	47.35
05–06–86	45.14
05–12–87	45.92
04–19–88	46.11
06–01–89	45.10
04–24–90	46.40

Well UJ–62–58–610
Owner: E.I. DuPont Co., well 103–3.1
Depth: 715 feet
Altitude: 7 feet

Date	Water level
04–12–85	48.02
05–06–86	46.67
05–12–87	46.35
04–19–88	45.19
06–01–89	45.33
04–24–90	45.60

Well UJ–62–58–611 (equipped with A–35 graphic recorder)
Owner: E.I. DuPont Co., well 103–2
Depth: 715 feet
Altitude: 8 feet

Date	Water level
02–20–85	46.95
04–08–85	47.22
11–04–85	46.76
02–27–86	45.81
05–08–86	45.00
08–20–86	45.20
10–28–86	46.71
03–25–87	45.20
05–12–87	45.12
08–05–87	46.56
04–12–88	44.90
10–25–88	46.00
06–01–89	45.09
11–22–89	45.49
04–24–90	45.48

Well UJ–62–58–613
Owner: E.I. DuPont Co., well 103–1.1
Depth: 723 feet
Altitude: 10 feet

Date	Water level
04–12–85	47.17
05–06–86	44.88
05–12–87	45.13
04–19–88	45.55
06–01–89	36.70
04–24–90	45.55

Well UJ–62–58–614
Owner: E.I. DuPont Co., well 103–1
Depth: 726 feet
Altitude: 11 feet

Date	Water level
04–12–85	49.39
05–06–86	47.04
05–12–87	46.16
06–01–89	47.61
04–24–90	47.72

Well UJ–62–58–615
Owner: Firestone Petrochemical Center, well P–817
Screen: 611–700 feet
Altitude: 9 feet

Date	Water level
04–10–85	45.63
04–30–86	45.91
04–21–87	46.67
04–19–88	47.37
06–01–89	46.42
04–25–90	43.76

Well UJ–62–58–616
Owner: Chevron Chemical Co., well 2
Depth: 718 feet
Altitude: 7 feet

Date	Water level
04–11–85	48.42
05–06–86	45.78

Well UJ–62–58–618
Owner: E.I. DuPont Co., well 103–6
Screen: 637–682 feet
Altitude: 5 feet

Date	Water level
04–12–85	43.48
05–06–86	41.78
05–12–87	42.35
04–24–90	41.85

Well UJ–62–58–629
Owner: Firestone Petrochemical Center, well P–821
Screen: 595–680 feet
Altitude: 5 feet

Date	Water level
04–26–90	44.61

Well UJ–62–58–631
Owner: Firestone Petrochemical Center, well P–826
Screen: 585–680 feet
Altitude: 6 feet

Date	Water level
04–10–85	53.16

Well UJ–62–58–632
Owner: Polysar Gulf Coast, Inc., well 1
Screen: 640–710 feet
Altitude: 8 feet

Date	Water level
04–24–90	38.34

Well UJ–62–58–633
Owner: Polysar Gulf Coast, Inc., well 2
Screen: 625–725 feet
Altitude: 5 feet

Date	Water level
04–10–85	38.39
05–05–86	36.14
04–24–87	37.60
04–13–88	35.91
06–05–89	35.38
04–25–90	37.18

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Well UJ–62–58–634

Owner: Polysar Gulf Coast, Inc., well 3

Screen: 615–715 feet

Altitude: 5 feet

Date	Water level
04–10–85	43.93
05–05–86	41.41
04–24–87	42.63
04–13–88	43.95
06–05–89	43.55
04–25–90	42.59

Well UJ–62–58–638

Owner: Chevron Chemical Co., well 6

Screen: 634–735 feet

Altitude: 5 feet

Date	Water level
04–25–90	48.35

Well UJ–62–58–639

Owner: Polysar Gulf Coast, Inc., well 4

Screen: 620–725 feet

Altitude: 5 feet

Date	Water level
04–10–85	41.11
05–05–86	38.80
04–24–87	42.35
04–13–88	38.66
06–05–89	40.17
04–25–90	41.70

Well UJ–62–58–640

Owner: Polysar Gulf Coast, Inc., well 5

Screen: 612–718 feet

Altitude: 5 feet

Date	Water level
04–25–90	43.60

Well UJ–62–58–641

Owner: E.I. DuPont Co., well 103–6

Screen: 697–702 feet

Altitude: 5 feet

Date	Water level
04–12–85	44.19
05–06–86	42.33
05–12–87	42.23
04–19–88	42.24
06–01–89	42.10
04–24–90	42.36

Well UJ–62–58–702

Owner: Orange County WCID 3, well 2

Screen: 600–672 feet

Altitude: 10 feet

Date	Water level
04–10–85	44.20
04–25–90	41.60

Well UJ–62–58–708

Owner: Gulf States Util. Co., Sabine, well 6

Depth: 465 feet

Altitude: 10 feet

Date	Water level
04–16–85	111.74
04–20–90	92.41

Well UJ–62–58–709

Owner: Orange County WCID 3, well 4

Screen: 617–698 feet

Altitude: 10 feet

Date	Water level
04–10–85	45.75
04–30–86	42.52
04–21–87	42.70
04–13–88	41.32
05–26–89	41.19
04–25–90	40.80

Well UJ–62–58–809

Owner: Orange County WCID 3, well 3

Screen: 570–650 feet

Altitude: 7 feet

Date	Water level
04–25–90	40.80

Well UJ–62–58–810

Owner: P.J. Silkwood

Screen: 160–170 feet

Altitude: 5 feet

Date	Water level
04–10–85	8.99
04–30–86	10.01
04–21–87	9.24
05–26–89	8.52
04–26–90	8.96

Well UJ–62–59–101

Owner: City of Orange, well 7

Screen: 555–666 feet

Altitude: 10 feet

Date	Water level
05–01–86	46.74
04–21–87	48.92
04–23–90	47.05

Well UJ–62–59–103

Owner: City of Orange, well 2

Screen: 565–685 feet

Altitude: 9 feet

Date	Water level
04–10–85	48.65
04–21–87	48.86
04–21–88	47.13
06–05–89	45.72

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Well UJ–62–59–105
Owner: Levingston Shipyard
Screen: 672–737 feet
Altitude: 9 feet

Date	Water level
02–20–85	45.80
04–08–85	45.76
11–04–85	45.18
02–27–86	44.32
04–29–86	44.13
08–20–86	46.04
03–25–87	44.02
08–05–87	45.20

Well UJ–62–59–123
Owner: City of Orange, well 9
Screen: 529–643 feet
Altitude: 10 feet

Date	Water level
04–10–85	43.86
05–01–86	36.84
04–21–87	43.74
04–21–88	42.18
06–05–89	41.28
04–23–90	42.56

Hardin County

Well LH–61–47–208
Owner: City of Silsbee, well 3
Screen: 442–842 feet
Altitude: 80 feet

Date	Water level
04–11–85	101.73
05–07–86	104.92
04–23–87	96.57
05–25–89	92.02
04–30–90	97.49

Well LH–61–47–210
Owner: City of Silsbee, well 2a
Screen: 782–890 feet
Altitude: 80 feet

Date	Water level
04–11–85	112.31
05–07–86	116.75
04–23–87	111.17
04–20–88	112.85
05–25–89	111.94
04–30–90	112.29

Well LH–61–47–304
Owner: City of Silsbee, well 4
Screen: 595–905 feet
Altitude: 80 feet

Date	Water level
04–30–90	103.46

Well LH–61–47–804
Owner: Lumberton MUD, well 2
Screen: 395–458 feet
Altitude: 55 feet

Date	Water level
04–10–85	61.80
05–07–86	58.47
04–23–87	56.86
04–20–88	60.70
05–26–89	59.39
04–27–90	47.83

Well LH–61–55–104
Owner: City of Beaumont, Loeb, well 3
Screen: 290–765 feet
Altitude: 40 feet

Date	Water level
05–06–86	[1]63.5
03–10–87	[1]58.5
03–01–88	[1]58.5
03–16–89	[1]61.5
04–27–90	67.60

[1] Reported by well owner.

Well LH–61–55–105
Owner: Lumberton MUD, well 3
Screen: 343–770 feet
Altitude: 43 feet

Date	Water level
04–10–85	[1]72.1
05–07–86	80.53
04–23–87	61.82
04–20–88	74.73
05–26–89	70.50
04–27–90	77.50

[1] Reported by well owner.

Well LH–61–55–203
Owner: City of Beaumont, Loeb, well 2
Screen: 301–775 feet
Altitude: 26 feet

Date	Water level
04–17–86	[1]75.5
04–28–87	[1]55.5
03–01–88	[1]82.5
03–16–89	[1]62.5
04–27–90	94.40

[1] Reported by well owner.

Well LH–61–55–204
Owner: City of Beaumont, Loeb, well 1
Screen: 311–780 feet
Altitude: 25 feet

Date	Water level
05–06–86	[1]71.0
03–10–87	[1]57.5
03–01–88	[1]58.5
02–09–89	[1]77.5
04–27–90	57.19

[1] Reported by well owner.

Well LH–61–55–206
Owner: Lumberton MUD, well 1
Screen: 380–443 feet
Altitude: 35 feet

Date	Water level
04–10–85	73.10
04–27–90	66.40

Jasper County

Well PR–61–48–209
Owner: Temple-Inland Forest Products Corp.
Screen: 213–594 feet
Altitude: 45 feet

Date	Water level
12–10–85	39.18
12–02–86	36.26
04–23–87	33.15
11–10–87	32.28
04–30–90	37.13

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Well PR–61–48–214

Owner: Southern Pine Co.

Depth: 226 feet

Altitude: 42 feet

Date	Water level
04–11–85	35.65
05–07–86	37.06
04–23–87	35.91
04–20–88	37.32
05–26–89	36.63

Well PR–61–48–221

Owner: Temple-Inland Forest Products Corp.

Screen: 723–1,264 feet

Altitude: 45 feet

Date	Water level
12–10–85	200.07
12–02–86	199.47
04–23–87	197.44
04–30–90	200.22

Well PR–61–48–701

Owner: Larkin Franklin

Screen: 1,210–1,250 feet

Altitude: 35 feet

Date	Water level
05–01–90	74.50

Well PR–61–48–702

Owner: J.C. Chance

Screen: 448–468 feet

Altitude: 30 feet

Date	Water level
04–15–85	45.97
04–28–86	46.13
05–11–87	42.87
04–11–88	42.48
05–26–89	42.02
05–01–90	44.79

Well PR–62–17–902

Owner: W.S. Gillespie

Screen: 300–325 feet

Altitude: 119 feet

Date	Water level
12–10–85	33.31
12–02–86	30.30
11–11–87	31.13
05–25–89	30.85
05–01–90	28.51

Well PR–62–25–308

Owner: S. Kirbyville Rural Water Supply Corp.

Screen: 575–625 feet

Altitude: 101 feet

Date	Water level
05–02–90	65.79

Well PR–62–33–211

Owner: Cougar Country Subdivision

Screen: 495–535 feet

Altitude: 85 feet

Date	Water level
04–12–85	72.38
04–23–87	76.40

Well PR–62–33–401

Owner: City of Buna WCID 1, well 2

Screen: 230–275 feet

Altitude: 72 feet

Date	Water level
04–12–85	30.91
04–23–87	29.50
04–20–88	29.70
05–25–89	31.85
05–02–90	29.97

Well PR–62–33–409

Owner: City of Buna WCID 1, well 1

Screen: 513–777 feet

Altitude: 72 feet

Date	Water level
04–12–85	89.86
05–07–86	91.83
05–25–89	82.33
05–02–90	87.53

Jefferson County

Well PT–61–64–502

Owner: Gulf States Util. Co., Neches, well 3

Screen: 306–435 feet

Altitude: 10 feet

Date	Water level
04–12–85	32.98
05–06–86	32.13
04–24–87	31.96
04–13–88	31.05
05–26–89	30.91
04–26–90	29.69

Well PT–61–64–509

Owner: Gulf States Util. Co., Neches, well 2

Screen: 380–542 feet

Altitude: 8 feet

Date	Water level
04–12–85	32.79

Well PT–63–01–606

Owner: City of Groves

Depth: 814 feet

Altitude: 5 feet

Date	Water level
04–11–85	32.76
05–06–86	33.14
04–24–87	31.29
04–13–88	30.77
05–26–89	30.16
04–27–90	29.42

Table 6. Water levels in observation wells in Orange County and adjacent counties, Texas, 1985–90—Continued

Newton County

Well TZ–62–18–801
Owner: Texas Forest Service
Screen: 186–210 feet
Altitude: 115 feet

Date	Water level
04–11–85	40.72
05–07–86	42.63
04–23–87	41.68
04–20–88	41.74
05–26–89	41.46
05–01–90	40.23

Well TZ–62–42–102
Owner: Frenchies Longron
Screen: 179–429 feet
Altitude: 37 feet

Date	Water level
04–08–85	30.94
05–07–86	30.41
04–22–87	30.10

Well TZ–62–42–603
Owner: L.S. Arrendell
Screen: 184–190 feet
Altitude: 22 feet

Date	Water level
04–08–85	5.96
04–29–86	7.81

Well TZ–62–42–904
Owner: L.A. Whidden
Depth: 270 feet
Altitude: 34 feet

Date	Water level
04–08–85	35.81
04–29–86	36.18
04–22–87	34.92
04–18–88	34.52
05–25–89	34.77
05–02–90	34.22

Table 7. Records of selected wells in Orange County, Texas, 1985–90

Water-bearing unit : CHCTL, lower unit of Chicot aquifer; CHCTU, upper unit of Chicot aquifer
Water level : Reported water levels in feet
Use of water : P, public supply; N, industrial; C, commercial; D, domestic
Type of data available : W, water-level measurements (table 6); Q, chemical analyses (table 8)
[ft, feet; in., inches; CSD, Consolidated School District; --, data not available]

Well number	Owner	Driller	Date completed	Well depth (feet)	Well diameter (inches)	Well screen	
						Total length (ft)	Depth interval (ft)
UJ–61–64–314	David Wilkinson	Jones Water Well Drilling Co.	1985	562	2	10	552–562
UJ–62–50–107	Mauriceville Water Supply Corp.	Baison Water Well Drilling Co.	1990	730	10.75, 6.62	50	680–730
UJ–62–50–912	Little Cypress-Mauriceville C.S.D.	Pascal Water Well Drilling Co.	1987	510	6	50	460–510
UJ–62–58–208	J.M. Huber Plastics	Baison Water Well Drilling Co.	1989	557	8, 4	30	509–539
UJ–62–58–514	Doan's Nursery	Paskell Water Well Drilling Co.	1975	400	4	--	--
UJ–62–58–515	Doan's Nursery	Paskell Water Well Drilling Co.	1983	275	4	--	--

Well number	Water-bearing unit	Altitude of land surface datum above sea level (ft)	Water level		Use of water	Type of data available
			Below land surface (ft)	Date of measurement		
UJ–61–64–314	CHCTL	16	--	--	D	Q
UJ–62–50–107	CHCTL	26	38	04/28/90	P	W
UJ–62–50–912	CHCTL	16	48.0	05/12/87	P	Q, W
UJ–62–58–208	CHCTL	14	50	07/01/89	N	W
UJ–62–58–514	CHCTL	8	--	--	C	Q, W
UJ–62–58–515	CHCTU	8	--	--	C	Q, W

Table 8. Chemical analyses of water from selected wells in Orange County, Texas, 1985–90

Owner : WCID, Water Control and Improvement District; ISD, Independent School District; CSD, Consolidated School District; Util., Utilities

Water-bearing unit : CHCTL, lower unit of Chicot aquifer; CHCTU, upper unit of Chicot aquifer

[ft, feet; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mg/L, milligrams per liter; --, not measured—water sampled from storage tank]

Well number	Owner	Screened interval or depth (ft)	Water-bearing unit	Date of sample	Specific conductance (µS/cm)	pH (standard units)	Temperature (°C)	Chloride, dissolved (mg/L)
UJ–61–56–614	Pine Forest School District	453–483	CHCTL	11–05–85	622	--	--	56
				10–28–86	718	--	--	90
				10–26–87	646	--	--	66
				10–18–88	709	--	--	80
				11–21–89	670	7.9	22.0	68
UJ–61–56–911	Community Water System	468–486	CHCTL	11–05–85	717	--	--	100
				10–28–86	743	--	--	100
				10–26–87	734	--	--	100
				10–18–88	791	--	--	120
				12–01–89	841	8.1	21.0	130
UJ–61–56–919	Orange County WCID 1, well 3	385–420	CHCTL	11–12–85	490	7.8	22.5	58
				11–03–86	476	7.6	22.5	48
				10–30–87	506	7.5	24.0	48
				10–21–88	495	7.4	23.0	49
				11–21–89	493	7.5	21.5	51
UJ–61–56–922	Orange County WCID 1, well 4	284–490	CHCTL	11–12–85	477	7.9	22.5	50
				11–03–86	471	7.9	22.0	44
				10–30–87	501	7.8	22.0	44
				10–21–88	487	7.6	22.0	47
				11–21–89	488	8.1	21.5	46
UJ–61–56–923	Orange County WCID 1, Tiger Lake	430–460	CHCTL	10–21–88	475	7.7	22.0	34
				04–18–90	471	7.6	21.5	34
UJ–61–64–302	Vidor ISD	521	CHCTL	11–08–85	1,910	--	--	500
				11–05–86	1,960	--	--	490
				10–18–88	1,980	--	--	480
				11–21–89	1,920	7.9	23.5	490
UJ–61–64–306	Larry Brewer	525–545	CHCTL	11–05–85	1,320	--	--	300
				10–28–86	1,580	--	--	370
				10–26–87	1,340	--	--	290
				10–18–88	1,330	--	--	300
				12–01–89	1,380	8.3	22.5	300
UJ–61–64–314	David Wilkinson	552–562	CHCTL	11–05–85	1,630	--	--	400
				10–28–86	1,690	--	--	400
				10–28–87	1,660	--	--	390
				10–17–88	1,630	--	--	390
				11–22–89	1,650	8.0	23.0	380
UJ–62–49–302	Mauriceville Water Supply Corp., well 1	320–350	CHCTL	11–15–85	180	6.9	22.5	16
				11–29–89	225	6.8	21.0	20
UJ–62–49–703	James Smith	693–703	CHCTL	11–12–85	2,340	7.9	23.5	640
				10–29–86	2,330	--	--	640
				11–03–87	2,420	--	--	640
				11–28–89	1,510	8.1	20.0	360

Table 8. Chemical analyses of water from selected wells in Orange County, Texas, 1985–90—Continued

Well number	Owner	Screened interval or depth (ft)	Water-bearing unit	Date of sample	Specific conductance (µS/cm)	pH (standard units)	Temperature (°C)	Chloride, dissolved (mg/L)
UJ–62–49–804	Parkview Subdivision	470–490	CHCTL	11–08–85	215	--	--	20
UJ–62–49–904	Texas Department of Transportation	399–415	CHCTL	11–04–85	238	--	--	16
				10–30–86	242	--	--	20
				10–28–87	234	--	--	20
				10–18–88	251	--	--	18
				11–29–89	229	7.5	22.0	15
UJ–62–49–905	Texas Department of Transportation	378–394	CHCTL	11–12–85	237	7.3	23.0	14
				10–21–88	244	--	--	16
				11–29–89	244	7.4	22.0	17
UJ–62–50–106	Mauriceville Water Supply Corp., well 2	445–480	CHCTL	11–15–85	228	7.0	23.0	28
				11–29–89	242	6.6	23.0	29
UJ–62–50–807	Henry L. Wilson	442–454	CHCTL	10–24–88	268	--	--	24
				11–29–89	260	7.2	18.0	23
UJ–62–50–808	H.D. Womack	643–655	CHCTL	11–14–85	625	6.8	23.5	130
				10–31–86	658	--	--	130
				11–02–87	652	--	--	140
				10–24–88	740	--	--	150
				04–18–90	770	6.9	21.0	160
UJ–62–50–910	Little Cypress-Mauriceville CSD	450–500	CHCTL	11–07–85	310	--	--	27
				11–05–86	326	--	--	30
				11–02–87	373	--	--	42
UJ–62–50–911	City of Orange, well 9	454–618	CHCTL	11–14–85	514	7.2	24.5	70
				10–31–86	542	7.3	24.0	79
				10–27–87	617	6.8	24.0	98
				10–25–88	657	7.2	24.0	110
				11–30–89	745	7.3	23.5	130
UJ–62–50–912	Little Cypress-Mauriceville CSD	460–510	CHCTL	10–27–88	314	7.4	23.0	30
				12–05–89	314	7.0	24.5	32
UJ–62–51–706	J.M. Huber Corp.	428–488	CHCTL	11–15–85	349	7.4	23.5	24
				11–05–86	344	--	--	24
				11–02–87	343	--	--	25
				10–27–88	340	7.4	24.0	23
				11–28–89	341	7.2	22.0	27
UJ–62–57–203	Joe M. Heinen	740	CHCTL	11–08–85	446	--	--	53
				10–29–86	455	--	--	51
				10–28–87	442	--	--	51
				10–17–88	463	--	--	51
				12–05–89	458	--	--	54
UJ–62–57–401	Texas Eastern Gas Pipeline Co.	448–468	CHCTL	11–05–85	477	--	--	62
				11–04–86	465	--	--	60
				10–29–87	485	--	--	100
				10–19–88	497	--	--	67
				12–06–89	494	8.4	21.0	68
UJ–62–57–403	Gulf States Util. Co., Vidor, well 1	433–483	CHCTL	11–13–85	1,510	7.9	24.0	380
				11–04–86	1,240	7.6	23.5	300
				10–28–87	1,380	7.5	24.0	350
				10–20–88	1,430	7.5	23.5	350
				11–22–89	1,550	7.8	23.5	380

Table 8. Chemical analyses of water from selected wells in Orange County, Texas, 1985–90—Continued

Well number	Owner	Screened interval or depth (ft)	Water-bearing unit	Date of sample	Specific conductance (µS/cm)	pH (standard units)	Temperature (°C)	Chloride, dissolved (mg/L)
UJ–62–57–404	Gulf States Util. Co., Vidor, well 2	430–481	CHCTL	11–13–85	3,580	7.5	24.5	1,100
				11–04–86	1,880	7.7	23.5	510
UJ–62–57–406	Gulf States Util. Co., Vidor, well 6	430–480	CHCTL	10–28–87	1,380	7.5	24.0	350
				10–20–88	1,430	7.6	24.0	360
UJ–62–57–407	Gulf States Util. Co., Vidor, well 4	320–370	CHCTL	11–13–85	1,510	7.7	24.0	380
UJ–62–57–408	Gulf States Util. Co., Vidor, well 5	343–383	CHCTL	11–13–85	1,520	7.8	24.5	380
				11–04–86	1,890	7.7	24.0	490
				10–28–87	1,440	7.6	24.0	350
				10–20–88	1,420	8.0	24.0	360
UJ–62–57–501	Enron Gas Pipeline Operating Co.	405–435	CHCTL	11–08–85	345	--	--	31
				10–29–86	374	--	--	35
				10–29–87	369	--	--	32
				10–17–88	377	--	--	29
				12–06–89	360	--	--	28
UJ–62–57–502	Texaco Inc.	478–528	CHCTL	11–08–85	342	--	--	22
				11–05–86	345	--	--	23
				11–03–87	355	--	--	22
				10–20–88	361	--	--	22
				12–06–89	352	8.1	19.0	22
UJ–62–57–605	Wade Granger	469–489	CHCTL	11–05–85	312	--	--	28
				10–29–86	325	--	--	27
				10–27–87	309	--	--	28
				10–25–88	322	--	--	29
				12–05–89	310	7.8	23.0	29
UJ–62–57–904	Gulf States Util. Co., Sabine, well 4	432–455	CHCTL	11–06–86	470	8.1	23.5	40
				11–04–87	492	7.9	24.0	44
				12–06–89	486	7.9	23.0	47
UJ–62–57–905	Gulf States Util. Co., Sabine, well 5	422–461	CHCTL	11–06–86	554	8.0	23.5	50
				10–26–88	576	7.9	23.5	50
				12–06–89	694	8.1	23.5	78
UJ–62–57–907	Gulf States Util. Co., Sabine, well 7	604–654	CHCTL	11–13–85	1,000	--	--	220
				11–05–86	1,010	8.1	25.0	220
				11–04–87	1,000	7.8	25.0	220
				10–26–88	981	7.7	25.0	220
				12–06–89	992	8.0	25.0	220
UJ–62–57–908	Gulf States Util. Co., Sabine, well 8	573–623	CHCTL	12–06–89	836	8.2	24.5	170
UJ–62–57–909	Gulf States Util. Co., Sabine, well 9	410–460	CHCTL	11–13–85	520	--	--	49
				11–04–87	536	7.9	24.0	44
				10–26–88	524	7.9	24.0	46
				12–06–89	528	8.1	24.0	47
UJ–62–58–304	Orange County WCID 2, well 1	626–706	CHCTL	11–06–85	834	7.4	24.5	170
				11–05–86	835	7.3	24.0	170
				10–28–87	806	7.1	24.5	160
				10–19–88	792	7.4	24.5	140
				12–08–89	851	7.5	24.0	170

Table 8. Chemical analyses of water from selected wells in Orange County, Texas, 1985–90—Continued

Well number	Owner	Screened interval or depth (ft)	Water-bearing unit	Date of sample	Specific conductance (µS/cm)	pH (standard units)	Temperature (°C)	Chloride, dissolved (mg/L)
UJ–62–58–305	City of Orange, well 8	520–610	CHCTL	11–14–85	800	6.9	24.5	160
				10–31–86	805	7.1	24.0	160
				10–27–87	796	6.6	24.0	160
				10–25–88	833	7.2	24.0	170
				11–30–89	847	7.1	23.5	180
UJ–62–58–325	Orange County WCID 2, well 2	620–670	CHCTL	11–06–85	749	7.4	24.5	140
				11–05–86	723	7.4	24.0	150
				10–28–87	723	7.1	24.5	140
				10–19–88	825	7.2	24.5	160
				12–08–89	753	7.6	22.5	140
UJ–62–58–326	City of Pinehurst, well 2	530–600	CHCTL	11–07–85	434	7.1	23.5	59
				11–06–86	465	7.1	24.0	64
				10–24–88	420	7.3	24.0	55
				12–08–89	474	7.3	23.0	66
UJ–62–58–402	Orangefield ISD	515–535	CHCTL	11–05–85	387	--	--	45
				10–29–86	402	--	--	46
				10–27–87	380	--	--	46
				10–19–88	354	--	--	33
				12–07–89	556	7.7	20.5	48
UJ–62–58–409	Johnny Sheppard	564–651	CHCTL	11–05–85	967	--	--	210
				11–04–86	974	--	--	210
				10–27–87	960	--	--	210
				10–25–88	941	--	--	210
				12–08–89	365	8.1	23.0	26
UJ–62–58–423	Community Water System	208–215	CHCTU	11–05–85	730	--	--	72
				11–06–86	801	--	--	73
				11–03–87	776	--	--	70
				10–26–88	780	--	--	71
				04–18–90	802	7.8	22.0	70
UJ–62–58–513	Bayou Pines Trailer Park	205–215	CHCTU	11–06–85	863	--	--	65
				10–29–86	864	--	--	66
				10–30–87	857	--	--	71
				10–26–88	840	--	--	65
UJ–62–58–514	Doan's Nursery	400	CHCTL	11–04–87	706	--	--	43
				10–27–88	704	--	--	42
				04–19–90	756	--	--	45
UJ–62–58–515	Doan's Nursery	275	CHCTU	11–04–87	710	--	--	41
				10–27–88	697	--	--	44
				04–19–90	738	--	--	44
UJ–62–58–605	Chevron Chemical Co., well 4	604–717	CHCTL	11–14–85	4,140	7.4	22.5	1,200
				11–06–86	4,070	--	--	1,200
				11–03–87	3,870	7.3	24.5	1,100
				10–26–88	4,020	7.4	24.0	1,200
				12–11–89	1,620	7.6	23.5	420
UJ–62–58–606	James River Corp., well 3	630–710	CHCTL	11–07–85	1,290	7.6	25.0	330
				11–03–87	1,350	7.5	24.5	340
				10–25–88	1,450	7.5	25.0	340
				12–11–89	1,420	7.7	24.0	350

Table 8. Chemical analyses of water from selected wells in Orange County, Texas, 1985–90—Continued

Well number	Owner	Screened interval or depth (ft)	Water-bearing unit	Date of sample	Specific conductance (μS/cm)	pH (standard units)	Temperature (°C)	Chloride, dissolved (mg/L)
UJ–62–58–608	Allied-Signal Inc.	620–735	CHCTL	11–06–85	1,800	7.5	25.0	480
				10–30–86	1,760	7.4	24.0	450
				10–29–87	1,730	7.6	24.0	460
				10–18–88	1,900	7.4	26.0	540
				12–12–89	2,760	8.0	22.0	400
UJ–62–58–609	E.I. DuPont Co., well 103–3	634–723	CHCTL	11–14–85	1,050	7.4	23.5	230
				11–04–86	1,040	7.7	25.0	230
				11–03–87	975	7.3	24.5	220
				10–25–88	203	7.6	24.0	30
				12–13–89	806	7.8	23.5	150
UJ–62–58–614	E.I. DuPont Co., well 103–1	726	CHCTL	11–14–85	1,270	7.3	23.0	300
				11–04–86	632	6.9	25.0	140
				11–03–87	1,230	7.1	24.5	280
				10–25–88	639	7.6	23.5	110
				12–13–89	1,230	7.7	19.0	290
UJ–62–58–615	Firestone Petrochemical Center, well P–817	611–700	CHCTL	10–20–88	924	7.4	25.0	190
				12–12–89	2,580	7.8	19.5	740
UJ–62–58–623	A. Schulman Co.	440–460	CHCTL	11–06–85	430	--	--	32
				10–30–86	458	--	--	34
				11–03–87	512	--	--	46
				10–26–88	395	--	--	23
				12–13–89	397	8.1	22.5	25
UJ–62–58–629	Firestone Petrochemical Center, well P–821	595–680	CHCTL	11–06–85	966	7.6	25.0	210
				11–04–86	932	7.6	24.5	200
				10–30–87	940	7.5	24.5	190
				10–20–88	921	7.5	25.0	190
				12–12–89	933	8.0	23.0	190
UJ–62–58–631	Firestone Petrochemical Center, well P–825	585–680	CHCTL	11–06–85	3,610	7.4	24.5	1,100
				11–04–86	3,690	7.5	24.5	1,060
				10–30–87	3,690	7.1	24.5	1,100
UJ–62–58–632	Polysar Gulf Coast, Inc., well 1	640–710	CHCTL	11–07–85	1,250	7.6	25.0	300
				10–30–86	1,240	7.6	24.5	310
				10–29–87	1,320	7.4	24.5	320
				10–19–88	1,370	7.3	25.0	320
				12–12–89	1,330	7.8	21.5	310
UJ–62–58–633	Polysar Gulf Coast, Inc., well 2	625–725	CHCTL	11–07–85	1,970	7.5	24.5	520
				10–30–86	1,960	7.6	24.5	530
				10–29–87	1,990	6.9	24.0	520
				10–19–88	1,220	7.5	24.0	270
				12–12–89	1,950	8.0	22.0	500
UJ–62–58–634	Polysar Gulf Coast, Inc., well 3	615–715	CHCTL	12–12–89	1,710	--	--	420
UJ–62–58–635	R.C.W., Inc.	639–689	CHCTL	11–14–85	375	7.7	24.5	34
				11–06–86	370	--	--	34
				11–03–87	375	--	--	31

Table 8. Chemical analyses of water from selected wells in Orange County, Texas, 1985–90—Continued

Well number	Owner	Screened interval or depth (ft)	Water-bearing unit	Date of sample	Specific conductance (μS/cm)	pH (standard units)	Temperature (°C)	Chloride, dissolved (mg/L)
UJ–62–58–638	Chevron Chemical Co., well 6	634–735	CHCTL	11–14–85	1,650	7.4	24.0	420
				11–06–86	1,630	7.7	25.0	400
				11–03–87	1,430	7.4	24.5	320
				10–26–88	1,480	7.5	24.5	360
				12–11–89	1,650	7.6	29.5	430
UJ–62–58–639	Polysar Gulf Coast, Inc., well 4	620–725	CHCTL	11–07–85	1,500	7.6	25.0	360
				10–19–88	1,790	7.5	24.5	450
UJ–62–58–640	Polysar Gulf Coast, Inc., well 5	612–718	CHCTL	10–30–86	1,200	7.6	24.5	280
				10–24–87	1,250	7.6	24.0	290
				10–19–88	1,210	7.5	24.5	290
				12–12–89	1,360	8.0	24.0	310
UJ–62–58–642	Ernest H. Willey	420–426	CHCTL	11–06–85	409	--	--	21
				10–30–86	406	--	--	24
				10–28–87	394	--	--	21
				10–26–88	399	--	--	21
				12–07–89	401	--	--	20
UJ–62–58–701	Texaco Inc.	704	CHCTL	11–05–86	1,030	8.0	24.5	220
				10–26–88	1,010	7.6	25.0	220
UJ–62–58–708	Gulf States Util. Co., Sabine, well 6	465	CHCTL	11–13–85	490	--	--	40
				11–05–86	491	8.3	24.5	49
				11–04–87	519	7.9	24.0	41
				12–07–89	507	8.1	23.5	44
UJ–62–58–709	Orange County WCID 3, well 4	617–698	CHCTL	11–13–85	1,030	8.0	25.0	220
				10–28–86	1,050	7.6	25.0	220
				10–29–87	1,030	7.8	25.0	210
				10–20–88	1,100	7.6	25.0	240
				12–07–89	1,120	8.1	25.0	250
UJ–62–58–809	Orange County WCID 3, well 3	570–650	CHCTL	11–13–85	1,060	8.0	25.0	220
				10–28–86	1,070	7.9	25.0	220
				10–29–87	1,080	7.9	25.0	220
				10–20–88	1,090	8.0	25.0	220
UJ–62–58–810	P.J. Silkwood	160–170	CHCTU	11–13–85	1,200	7.5	23.0	210
				10–28–86	1,190	--	--	210
				10–29–87	1,200	--	--	210
				10–18–88	1,200	--	--	210
				12–07–89	1,140	7.8	21.0	190
UJ–62–59–101	City of Orange, well 7	555–666	CHCTL	11–14–85	790	7.3	24.5	150
				10–31–86	794	7.4	24.0	150
				10–27–87	798	7.1	24.0	150
				10–25–88	809	7.4	24.0	150
				11–30–89	819	7.5	23.5	150
UJ–62–59–123	City of Orange, well 9	529–643	CHCTL	10–25–88	382	7.2	24.0	32
				11–30–89	375	7.5	23.0	36
UJ–62–59–124	Equitable Bag Co.	590–640	CHCTL	11–15–85	750	7.1	24.5	150
				11–05–86	744	7.2	24.0	140
				11–02–87	773	6.9	24.0	160
				10–27–88	777	7.4	24.0	150
				04–19–90	802	7.4	24.0	160