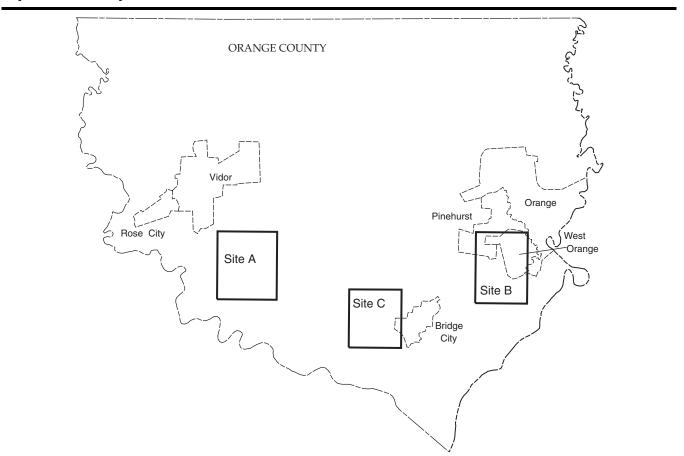


In cooperation with the Orange County Commissioner's Court

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

Open-File Report 99-603



U.S. Department of the Interior

U.S. Geological Survey

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By Mark C. Kasmarek

U.S. GEOLOGICAL SURVEY Open-File Report 99-603

In cooperation with the Orange County Commissioner's Court

Austin, Texas 1999

U.S. DEPARTMENT OF THE INTERIOR

Bruce Babbitt, Secretary

U.S. GEOLOGICAL SURVEY

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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

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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 southcentral 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.
- 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.

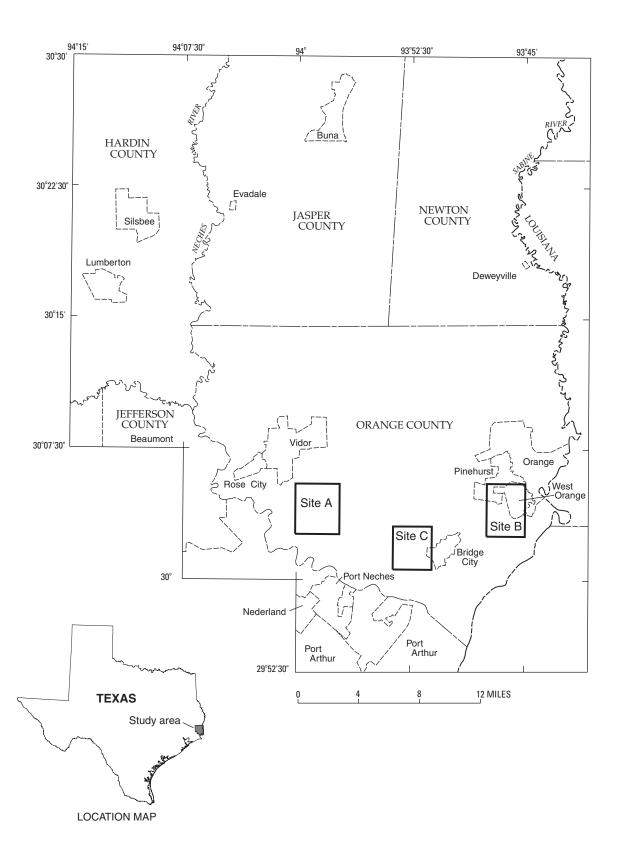


Figure 1. Location of study area.

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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 surfacewater 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 twoletter 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

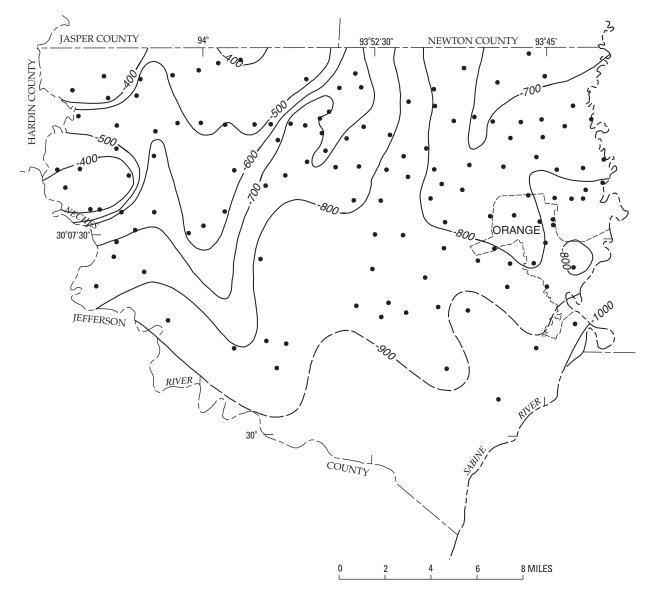
1-degree quadrangle. Plate 1 shows the locations of wells that were inventoried during 1985–90 plus locations of a representative number of wells inventoried during preceding periods.

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).

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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 aguifer 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 aguifer 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

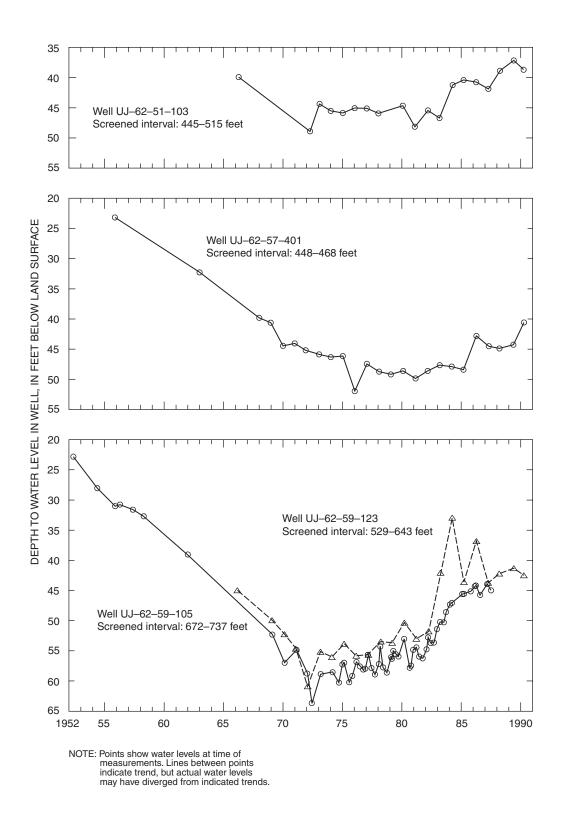


Figure 3. Hydrographs showing changes in water levels in wells screened in the lower unit of the Chicot aquifer in Orange County, Texas.

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 groundwater 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

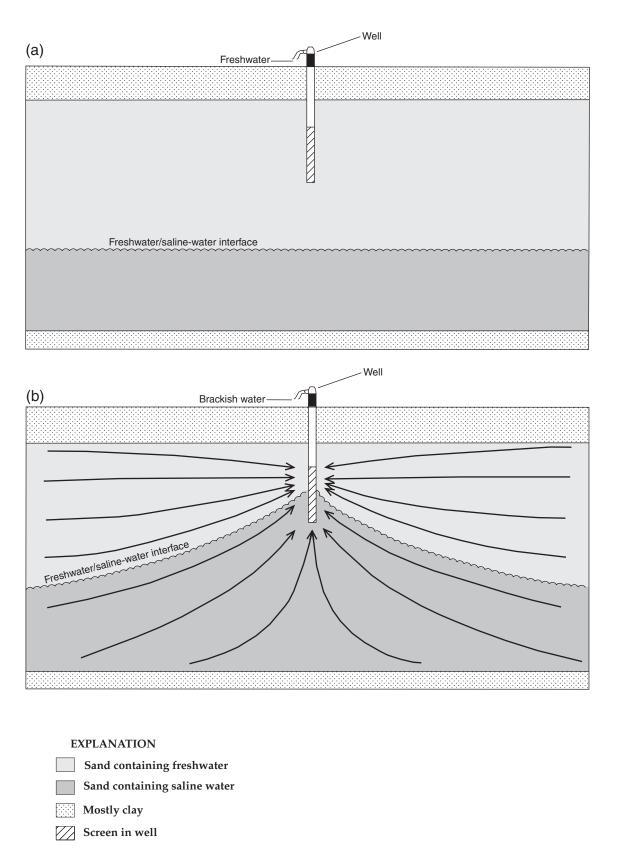


Figure 4. Conceptual profiles showing (a) relation between freshwater and saline water before pumping begins and (b) development of a saline-water cone during pumping (modified from Nyman, 1984).

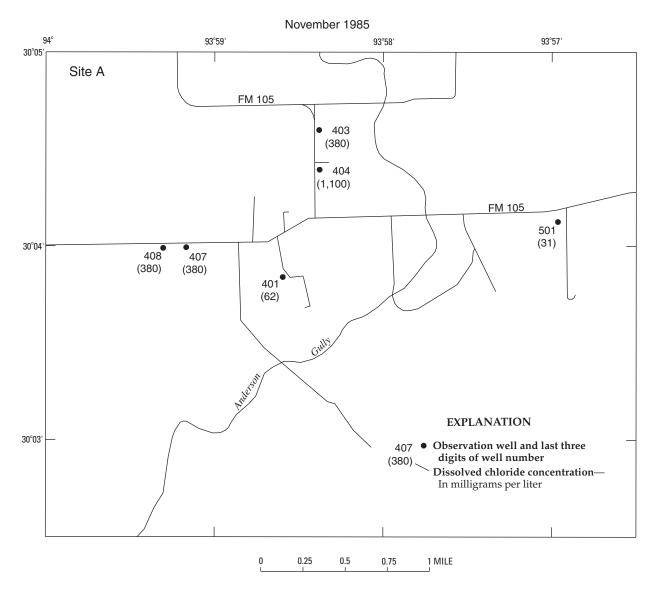


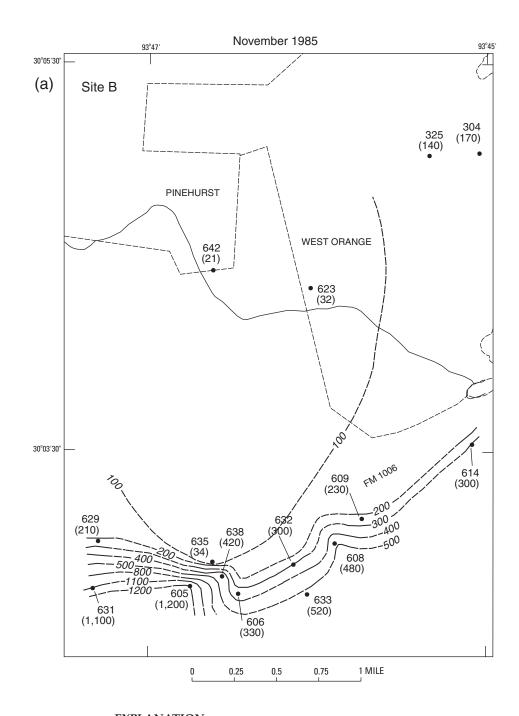
Figure 5. Dissolved chloride concentrations in water from selected wells screened in the lower unit of the Chicot aquifer at site A in southwestern Orange County, Texas, November 1985.

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 μ S/cm. The plot also shows that the equation is less

accurate and the relation becomes nonlinear when specific conductances are less than $800 \,\mu\text{S/cm}$ or greater than $2,500 \,\mu\text{S/cm}$. 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.



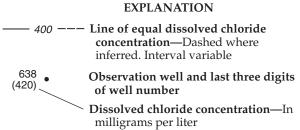
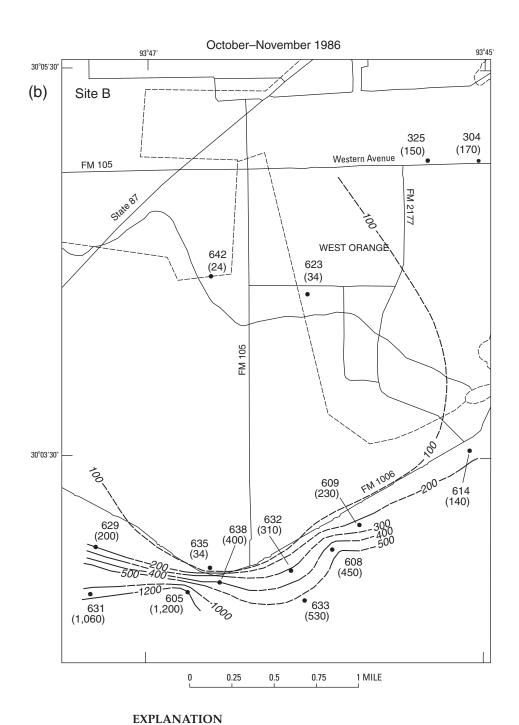
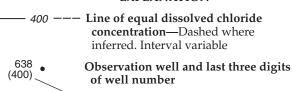


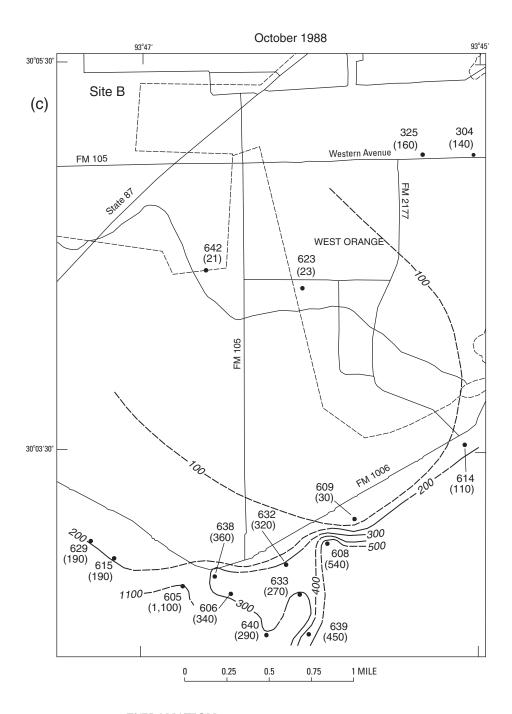
Figure 6. Dissolved chloride concentrations in water from selected wells screened in the lower unit of the Chicot aquifer at Site B in southeastern Orange County, Texas, (a) November 1985, (b) October–November 1986, and (c) October 1988.





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.

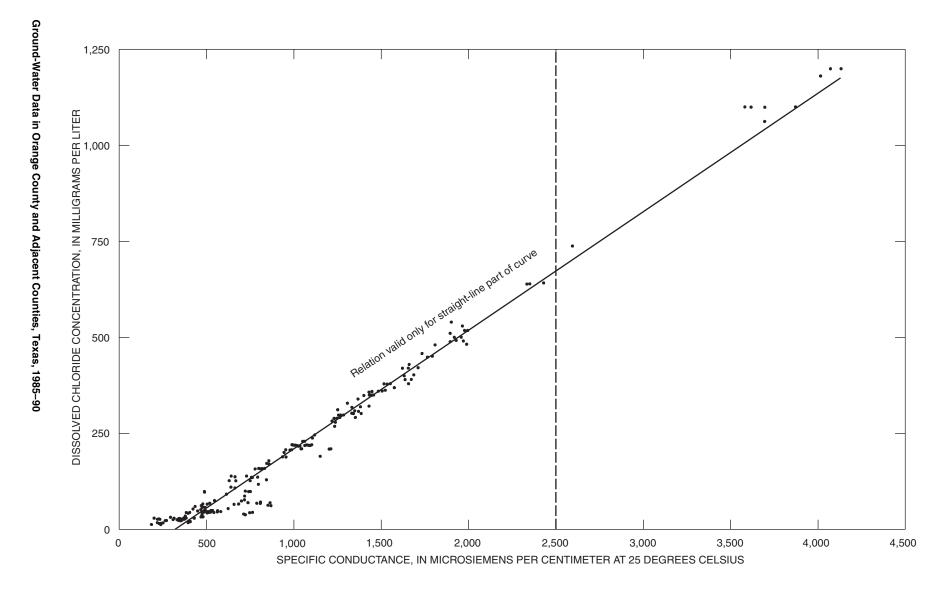


Figure 7. Relation between specific conductance and dissolved chloride concentrations in water from wells screened in the lower unit of the Chicot aquifer, Orange County, Texas, 1985–89.

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 aguifer 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)]

System	Series	Harder (1960)	Harder and others (1967)	Wesselman (1965)	Wesselman (1971)		This report
	Hydrologic unit						
	Holocene)	
Q U	Chicot shallow Pleistocene		Shallow sand	Upper aquifer	Upper unit of Chicot aquifer	C h i	Upper unit of Chicot aquifer
A T		"200-foot"	Upper sand		uquiici	o t	aquitei
E R	sand unit "500-foot" sand Undifficultion entiate "700-foot" lower sand	sand	unit	Clay beds		a	Clay beds
N A		TT. 4:66		Lower unit of Chicot aquifer	q u		
R Y		entiated lower sand unit	Middle aquifer		i f e r	Lower unit of Chicot aquifer	
T E R T I A	Pliocene	Evangeline aquifer	Evangeline aquifer	Lower aquifer	Evangeline aquifer		Evangeline aquifer
R Y	Miocene				Burkeville confining uni	t	

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 U.J-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 U.J-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 U.J-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 U.J-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 U.J-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 U.J-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 U.J-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 U.J-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 U.J-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.

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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 U.J-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 U.J-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 U.J-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 U.J-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

Water level
43.93
41.41
42.63
43.95
43.55
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

40.80

Well UJ-62-58-810

04-25-90

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. 213–594 fe

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

Water level
45.97
46.13
42.87
42.48
42.02
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

89.86
91.83
82.33
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]

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

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

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 conduc- tance (µS/cm)	pH (standard units)	Temper- ature (°C)	Chloride, dissolved (mg/L)
UJ-62-57-404	Gulf States Util. Co.,	430–481	CHCTL	11-13-85	3,580	7.5	24.5	1,100
	Vidor, well 2			11–04–86	1,880	7.7	23.5	510
UJ-62-57-406	Gulf States Util. Co.,	430-480	CHCTL	10-28-87	1,380	7.5	24.0	350
	Vidor, well 6			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.,	343-383	CHCTL	11-13-85	1,520	7.8	24.5	380
	Vidor, well 5			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	405-435	CHCTL	11-08-85	345			31
	Operating Co.			10-29-86	374			35
	1 0			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.,	432-455	CHCTL	11-06-86	470	8.1	23.5	40
	Sabine, well 4			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.,	422-461	CHCTL	11-06-86	554	8.0	23.5	50
	Sabine, well 5			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.,	604–654	CHCTL	11-13-85	1,000			220
	Sabine, well 7			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.,	410–460	CHCTL	11–13–85	520			49
C3 02 31-709	Sabine, well 9	110 700	CHCIL	11–13–83	536	7.9	24.0	44
	200me,			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,	626–706	CHCTL	11-06-85	834	7.4	24.5	170
50 52 50-50 1	well 1	020 700	CHICIL	11-05-86	835	7.4	24.0	170
				10-28-87	806	7.1	24.5	160
				10–19–88	792	7.4	24.5	140
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 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 conduc- tance (µS/cm)	pH (standard units)	Temper- ature (°C)	Chloride, dissolved (mg/L)
UJ-62-58-305	City of Orange, well 8	520–610	CHCTL	11-14-85 10-31-86 10-27-87 10-25-88 11-30-89	800 805 796 833 847	6.9 7.1 6.6 7.2 7.1	24.5 24.0 24.0 24.0 23.5	160 160 160 170 180
UJ-62-58-325	Orange County WCID 2, well 2	620–670	CHCTL	11-06-85 11-05-86 10-28-87 10-19-88 12-08-89	749 723 723 825 753	7.4 7.4 7.1 7.2 7.6	24.5 24.0 24.5 24.5 22.5	140 150 140 160 140
UJ-62-58-326	City of Pinehurst, well 2	530–600	CHCTL	11-07-85 11-06-86 10-24-88 12-08-89	434 465 420 474	7.1 7.1 7.3 7.3	23.5 24.0 24.0 23.0	59 64 55 66
UJ-62-58-402	Orangefield ISD	515–535	CHCTL	11–05–85 10–29–86 10–27–87 10–19–88 12–07–89	387 402 380 354 556	 7.7	 20.5	45 46 46 33 48
UJ-62-58-409	Johnny Sheppard	564–651	CHCTL	11-05-85 11-04-86 10-27-87 10-25-88 12-08-89	967 974 960 941 365	 8.1	 23.0	210 210 210 210 210 26
UJ-62-58-423	Community Water System	208–215	CHCTU	11-05-85 11-06-86 11-03-87 10-26-88 04-18-90	730 801 776 780 802	 7.8	 22.0	72 73 70 71 70
UJ-62-58-513	Bayou Pines Trailer Park	205–215	CHCTU	11–06–85 10–29–86 10–30–87 10–26–88	863 864 857 840	 	 	65 66 71 65
UJ-62-58-514	Doan's Nursery	400	CHCTL	11-04-87 10-27-88 04-19-90	706 704 756	 	 	43 42 45
UJ-62-58-515	Doan's Nursery	275	CHCTU	11-04-87 10-27-88 04-19-90	710 697 738	 	 	41 44 44
UJ-62-58-605	Chevron Chemical Co., well 4	604–717	CHCTL	11–14–85 11–06–86 11–03–87 10–26–88 12–11–89	4,140 4,070 3,870 4,020 1,620	7.4 7.3 7.4 7.6	22.5 24.5 24.0 23.5	1,200 1,200 1,100 1,200 420
UJ-62-58-606	James River Corp., well 3	630–710	CHCTL	11–07–85 11–03–87 10–25–88 12–11–89	1,290 1,350 1,450 1,420	7.6 7.5 7.5 7.7	25.0 24.5 25.0 24.0	330 340 340 350

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 conduc- tance (µS/cm)	pH (standard units)	Temper- ature (°C)	Chloride, dissolved (mg/L)
UJ-62-58-608	Allied-Signal Inc.	620–735	CHCTL	11-06-85 10-30-86	1,800 1,760	7.5 7.4	25.0 24.0	480 450
				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.,	634-723	CHCTL	11-14-85	1,050	7.4	23.5	230
	well 103-3			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.,	726	CHCTL	11–14–85	1,270	7.3	23.0	300
	well 103-1			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	611–700	CHCTL	10-20-88	924	7.4	25.0	190
	Center, well P–817			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	395 397	8.1	22.5	23 25
III (2 50 (20	E' (D (1 ' 1	505 (00	CHOTH	12–13–89				
UJ-62-58-629	Firestone Petrochemical	595–680	CHCTL	11-06-85	966	7.6	25.0	210
	Center, well P-821			11–04–86 10–30–87	932 940	7.6 7.5	24.5 24.5	200 190
				10-30-87	940	7.5 7.5	25.0	190
				12–12–89	933	8.0	23.0	190
UJ-62-58-631	Firestone Petrochemical	585–680	CHCTL	11-06-85	3,610	7.4	24.5	1,100
	Center, well P-825			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.,	640-710	CHCTL	11-07-85	1,250	7.6	25.0	300
	well 1			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.,	625–725	CHCTL	11-07-85	1,970	7.5	24.5	520
	well 2			10–30–86	1,960	7.6	24.5	530
				10-29-87	1,990	6.9	24.0	520
				10–19–88 12–12–89	1,220 1,950	7.5 8.0	24.0 22.0	270 500
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 conduc- tance (µS/cm)	pH (standard units)	Temper- ature (°C)	Chloride, dissolved (mg/L)
UJ-62-58-638	Chevron Chemical Co., well 6	634–735	CHCTL	11–14–85 11–06–86 11–03–87 10–26–88 12–11–89	1,650 1,630 1,430 1,480 1,650	7.4 7.7 7.4 7.5 7.6	24.0 25.0 24.5 24.5 29.5	420 400 320 360 430
UJ-62-58-639	Polysar Gulf Coast, Inc., well 4	620–725	CHCTL	11–07–85 10–19–88	1,500 1,790	7.6 7.5	25.0 24.5	360 450
UJ-62-58-640	Polysar Gulf Coast, Inc., well 5	612–718	CHCTL	10–30–86 10–24–87 10–19–88 12–12–89	1,200 1,250 1,210 1,360	7.6 7.6 7.5 8.0	24.5 24.0 24.5 24.0	280 290 290 310
UJ-62-58-642	Ernest H. Willey	420–426	CHCTL	11–06–85 10–30–86 10–28–87 10–26–88 12–07–89	409 406 394 399 401	 	 	21 24 21 21 20
UJ-62-58-701	Texaco Inc.	704	CHCTL	11–05–86 10–26–88	1,030 1,010	8.0 7.6	24.5 25.0	220 220
UJ-62-58-708	Gulf States Util. Co., Sabine, well 6	465	CHCTL	11–13–85 11–05–86 11–04–87 12–07–89	490 491 519 507	8.3 7.9 8.1	24.5 24.0 23.5	40 49 41 44
UJ-62-58-709	Orange County WCID 3, well 4	617–698	CHCTL	11–13–85 10–28–86 10–29–87 10–20–88 12–07–89	1,030 1,050 1,030 1,100 1,120	8.0 7.6 7.8 7.6 8.1	25.0 25.0 25.0 25.0 25.0	220 220 210 240 250
UJ-62-58-809	Orange County WCID 3, well 3	570–650	CHCTL	11–13–85 10–28–86 10–29–87 10–20–88	1,060 1,070 1,080 1,090	8.0 7.9 7.9 8.0	25.0 25.0 25.0 25.0	220 220 220 220
UJ-62-58-810	P.J. Silkwood	160–170	СНСТИ	11–13–85 10–28–86 10–29–87 10–18–88 12–07–89	1,200 1,190 1,200 1,200 1,140	7.5 7.8	23.0 21.0	210 210 210 210 210 190
UJ-62-59-101	City of Orange, well 7	555–666	CHCTL	11–14–85 10–31–86 10–27–87 10–25–88 11–30–89	790 794 798 809 819	7.3 7.4 7.1 7.4 7.5	24.5 24.0 24.0 24.0 23.5	150 150 150 150 150
UJ-62-59-123	City of Orange, well 9	529–643	CHCTL	10–25–88 11–30–89	382 375	7.2 7.5	24.0 23.0	32 36
UJ-62-59-124	Equitable Bag Co.	590–640	CHCTL	11–15–85 11–05–86 11–02–87 10–27–88 04–19–90	750 744 773 777 802	7.1 7.2 6.9 7.4 7.4	24.5 24.0 24.0 24.0 24.0	150 140 160 150 160