The “1,200-foot” sand of the Baton Rouge area is a major source of fresh ground water in a five-parish area which includes East and West Baton Rouge, East and West Feliciana, and Pointe Coupee Parishes (referred to as the Baton Rouge area) in southeastern Louisiana (fig. 1). In 2001, the “1,200-foot” sand was the fourth most heavily pumped aquifer of the 14 aquifers (fig. 2) underlying the area. In 2001, about 375 Mgal/d was withdrawn from the “1,200-foot” sand in the Baton Rouge area (fig. 3). Of this amount, about 57 percent was used for public supply, about 4 percent for power generation, and about 38 percent for industrial purposes (D.C. Dial, Capital Area Ground Water Conservation Commission, written commun., 2002). Most of the water, about 18.5 Mgal/d, was withdrawn in East Baton Rouge Parish (D.C. Dial, Capital Area Ground Water Conservation Commission, written commun., 2002). From 1990 to 2001, withdrawals from the “1,200-foot” sand increased by about 20 percent (16.6 to 20.8 Mgal/d, fig. 3) in the Baton Rouge area.

Pumpage from the “1,200-foot” sand has caused water-level declines in the Baton Rouge area (Meyer and Taran, 1953, p. 55, 57). Previous studies have indicated the possibility that saltwater encroachment (horizontal movement) into freshwater areas has occurred (Tomaszewski, 1996, p. 6; Whitman, 1979, p. 41-42).

Additional knowledge about ground-water flow and effects of withdrawals on the “1,200-foot” sand of the Baton Rouge area is needed to assess ground-water development potential and to protect the resource. To meet this need, the U.S. Geological Survey (USGS), in cooperation with the Capital Area Ground Water Conservation Commission (CAGWCC), began a study in 2000 to measure and document the current (2001) water levels in wells screened in the “1,200-foot” sand, construct a potentiometric-surface (water-level) map, and to evaluate changes in the potentiometric surface from 1977 to 2001.

This report presents data and maps that describe the potentiometric surface of the “1,200-foot” sand of the Baton Rouge area during the spring of 2001. Graphs of water levels in selected wells and water withdrawals from the “1,200-foot” sand are shown to present the historical changes in water levels and water use. The potentiometric-surface map illustrates the water levels and ground-water flow directions in the aquifer for spring 2001. Water-level and water-use data are on file at the USGS and CAGWCC offices in Baton Rouge, Louisiana.

Description of Study Area

The study area (fig. 1) extends about 2,000 m² and includes East and West Baton Rouge, East and West Feliciana, and Pointe Coupee Parishes (Carlin and Fossa, 1997, p. 155). The City of Baton Rouge and several industrial facilities are located in the study area along the Mississippi River. The climate is generally warm and temperate with high humidity and frequent rain. At Baton Rouge, the average annual temperature is 69°F, and the average annual rainfall is about 60 in. (National Oceanic and Atmospheric Administration, 1995, p. 4, 5). With the exception of the Baton Rouge metropolitan area, much of the study area is rural and agricultural.

Hydrogeologic Setting

The study area is a sequence of complexly interbedded, interlaminated, lenticular, alluvium, freshwater-bearing, sand, and graveliferous sands that form a wedge of sediment that dips and thickens in a south-to-southwest direction. Fourteen freshwater aquifers (fig. 2) in the area are composed of sediment that can contain very fine to coarse sand and pebbly-cobble-size gravel (Meyer and Taran, 1953, p. 15-47). Thickness of the aquifers were originally named according to their general depth in the Baton Rouge industrial district (Meyer and Taran, 1953, p. 15). A prominent hydrogeologic feature in the region is the Baton Rouge fault (fig. 1) which extends from east of the study area, through East and West Baton Rouge Parish, to west of the study area (Duchams and Seals, 1961, p. 160-169; McCullagh, 1961, p. 1-26).

Precipitation in the northern part of the study area and north of the study area in Mississippi is the primary source of recharge to the “1,200-foot” sand. Because the aquifers in the region are interconnected, some infiltration precipitation percolates down into and through the aquifers in the recharge area to the stratigraphic aquifers, which include the “1,200-foot” sand (Morgan, 1963, p. 11-15). Generally, water continues to move downslope in a south-southwest direction through the aquifer toward the Baton Rouge fault at rates that range from a few tens of feet per year to several hundred feet per year (Brown, 1985, p. 24).

The southern limit of freshwater in the “1,200-foot” sand generally is considered to be at or near the Baton Rouge fault (Tomaszewski, 1996, p. 6).

Development of the “1,200-foot” sand increased substantially after 1953 (Morgan, 1961, p. 56, 38; Kazann, 1979, fig. 9). From 1943 to 2001, water levels declined about 140 ft or less west of WRB-5 F.I., 37. Well WRB-5 is the location of pumping centers in the Baton Rouge industrial district (fig. 4). However, from 1961 to 2001, water levels at EF-6 have changed less than 25 ft (fig. 5). Although both wells are screened in the “1,200-foot” sand, well EF-6 is 61 ft below the area where large and small water withdrawals occur.

Before development, water entered the “1,200-foot” sand in the recharge area, and flow generally in a south to southeast direction to the discharge area near the Baton Rouge fault (Meyer and Taran, 1953, p. 51; Morgan, 1963, p. 13). At the discharge area, the Baton Rouge fault can act as a highly permeable horizontal ground-water flow (Whitman, 1979, p. 12, 13). Also, water from the recharge area would move upward (probably along the fault) from the “1,500-foot” sand to the “2,000-foot” sand and from the “1,200-foot” sand into the “1,000-foot” sand.

Figure 2. Hydrogeologic units in the Baton Rouge area, southeastern Louisiana (modified from Stewart and others, 1994, fig. 5; Lovelace and Lovelace, 1995, p. 4).
Acknowledgments

The authors gratefully acknowledge the assistance and cooperation of numerous public water suppliers, industrial facilities, and private well owners who allowed water levels to be measured in their wells. A special thanks is given to Don C. Dial, Director, Capital Area Ground Water Conservation Commission, for his support and assistance during the preparation of this report.

POTENTIOMETRIC SURFACE

Potentiometric-surface maps (figs. 4, 5) were constructed using water-level data from 25 wells completed in the “1,200-foot” sand (table 1). Water levels were measured during April and May 2001. Water levels were measured using steel or electrical tapes marked with 0-1-ft graduations. Wells in which water levels were measured were not being pumped at the time the measurements were made. If wells recently were pumped, water levels were measured after an appropriate recovery period. Water levels were measured south of the Baton Rouge Metropolitan Area where the aquifer is offset and hydrologically separated from its equivalent unit north of the fault.

The highest water level, 154.19 ft above NGVD 29, was measured at well WF-169 in northern West Feliciana Parish (table 1). The lowest water levels were below 90 ft below NGVD 29 were measured at wells EB-580 and EL-600 in the industrial district (table 1, fig. 3). Water levels were measured at 90 ft below NGVD 29 to map the Baton Rouge metropolitan area. A small cone of depression about 5 ft above NGVD 29 was noted at well PC-180 in eastern Pointe Coupee Parish. Another cone of depression about 90 ft below NGVD 29 was located at well EB-946. A comparison between the 1990 (Tommasini, 1990, fig. 3) and the 2001 potentiometric-surface maps of the “1,200-foot” sand indicates water levels in the Baton Rouge metropolitan area declined about 20 ft during the 11-year period.

In spring 2001, the flow of water in the “1,200-foot” sand in the Baton Rouge area generally was down gradient from the recharge area toward pumping centers along the Mississippi River and in Baton Rouge (figs. 1, 4, 5). In East and West Feliciana Parishes, flow was toward southeast toward Baton Rouge. East and West Baton Rouge and southeastern Pointe Coupee Parishes, flow was radial toward the industrial district.

SELECTED REFERENCES


Department of Public Works, 58 p.


University of Louisiana at Baton Rouge, Louisiana Water Resources Research Institute Bulletin 9, 190 p.


Water-level data used to construct the potentiometric-surface map of the “1,200-foot” sand in the Baton Rouge area, southeastern Louisiana, spring 2001 [Well locations and numbers are shown in figures 4 and 5].

<table>
<thead>
<tr>
<th>Well number</th>
<th>Lat.</th>
<th>Long.</th>
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Figure 4. Potentiometric surface of the “1,200-foot” sand in the Baton Rouge area, southeastern Louisiana, spring 2001.

By Jason M. Griffith and John K. Lovelace

2003