INTRODUCTION

The "1,500-foot" sand of the Baton Rouge area is a major source of fresh ground water in a large portion of the area which includes East and West Baton Rouge, East and West Feliciana, and Pointe Coupee Parish (henceforward referred to as the Baton Rouge area) in southeastern Louisiana (fig. 1). In 2005, the "1,500-foot" sand was the fifth most heavily pumped aquifer of the 14 aquifers (fig. 2) underlying this area. In 2001, about 17.8 Mgal/d was withdrawn from the "1,500-foot" sand in the Baton Rouge area (fig. 3). Of this amount, about 85 percent was used for public supply and about 15 percent for industrial purposes (D. C. Dial, Capital Area Ground Water Conservation Commission, written communication, 2002). Most of the water, about 14.5 Mgal/d, was withdrawn in East Baton Rouge Parish (D. C. Dial, Capital Area Ground Water Conservation Commission, written communication, 2002). From 1990 to 2001, withdrawals from the "1,500-foot" sand decreased by about 9 percent (from about 19.5 to 17.8 Mgal/d) (fig. 3) in the Baton Rouge area.

Pumping from the "1,500-foot" sand has caused water-level declines in the Baton Rouge area (Moyer and Turcan, 1955, p. 54-57). Also, previous studies have shown that shallow groundwater flow in the "1,500-foot" sand of the Baton Rouge area is affected by long-term water development potential and to predict the response. 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 "1,500-foot" sand, construct a potentiometric-surface (water-level) map, and to evaluate changes in the potentiometric surface.

This report presents data and maps that describe the potentiometric surface of the selected wells and water-level data from the "1,500-foot" sand are presented to show the interaction between water levels and ground-water flow directions in the aquifer for the 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 across about 2,000 km² and includes East and West Baton Rouge, East and West Feliciana, and Pointe Coupee Parish (Cabantous and Few, 1987, p. 153). 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 humid with high humidity and intermittent, at Baton Rouge, the average annual temperature is 68°F, and the average annual rainfall is about 60 in. (National Oceanic and Atmospheric Administration, 1995, p. 5, 9). 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 complex of separated, interconnected, lensoid, alluvial, freshwater-bearing, and shallow freshwater-bearing or that form a wedge of sediment that dips and thins in a roughly southeast direction. Fourteen freshwater aquifers (fig. 2) in the area are comprised of sediment that contain very fine to coarse sands and peat-sand gravel (Moyer and Turcan, 1955, p. 21-47). Thickness of the aquifers are originally named according to their general depth in the Baton Rouge industrial district (Moyer and Turcan, 1955, p. 21-47). The aquifers extend from east of the study area through East and West Baton Rouge Parishes to west of the study area (Durham and Peace, 1956, Moyer, 1961, p. 180-190, Whitman, 1979, p. 4, McCollum, 1991).

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 "1,500-foot" sand. Because the aquifers in the region are interconnected, some significant precipitation percolates into and through the aquifers, which is then transported as ground water to deeper interconnected aquifers, which include the "1,500-foot" sand (Morgan, 1963, p. 11-13). Generally, water moves to more southern locations in a roughly southeast direction through the aquifer toward the Gulf of Mexico fault zone where it ranges from 20 to 60 feet per year to several hundred feet per year by 2001 (Baumside, 1983, p. 24). The discharge of fresh water is to the "1,500-foot" sand generally is considered to be at or near the Baton Rouge fault (Moyer and Turcan, 1956, p. 6).

Development of the "1,500-foot" sand began after 1798 (Tevis and Whitman, 1982, table 4, fig. 4). Although some water levels declined about 180 ft in well EB-104 (fig. 3). Well EB-168 is located near pumping in the Baton Rouge, Louisiana (fig. 4). However, from 1990 to 2001 water levels at well PC-39 changed less than 27 ft (fig. 3). Although both wells are screened in the "1,500-foot" sand, well PC-39 is located near the recharge area and where little or no water withdrawal occurs.

Before development, water entered the "1,500-foot" sand in the recharge area, and flowed generally in a south to southwest direction to the discharge area near the Baton Rouge fault (Moyer and Turcan, 1955, p. 21; Morgan, 1963, p. 12, 13). Also, water from the recharge area would move upward (probably along the fault) from the "1,500-foot" sand into the "1,500-foot" sand and then into the "1,500-foot" sand due to vertical head differences of the aquifers in the recharge area.
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. Dyal, 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 21 wells completed in the "1,500-foot" sand (table 1). Water levels primarily were measured during April and May 2001; one measurement was made during July 2001. Water levels were measured using steel or electrical tape marked with 0.01-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 not measured south of the Baton Rouge fault where the aquifer is offset and hydrologically separated from its equivalent unit north of the fault. Also, flow in wells EB-251 is continuous; therefore, the water level in the well probably is not representative of the water level in the "1,500-foot" sand near the well and was not used to construct the potentiometric surface shown in figure 4 and 5.

The highest water level, 123.48 ft above NGVD 29, was measured at well EF-210 in northern East Feliciana Parish (table 1). The lowest water level, 135.23 ft below NGVD 29, was measured at well EB-617 in Baton Rouge (table 1, fig. 5). Water levels were more than 70 ft below NGVD 29 in most of the Baton Rouge metropolitan area. A small cone of depression about 60 ft below NGVD 29 was noted in the vicinity of well EB-603 in northeastern East Baton Rouge Parish (fig. 4). Another small cone of depression about 100 ft below NGVD 29 was noted at well EB-613. The cones and other potentiometric lows were in areas where large ground-water withdrawals occurred. A comparison between the 1990 (Tomaszewski, 1996, fig. 5) and 2001 potentiometric-surface maps of the "1,500-foot" sand indicates water levels in the Baton Rouge metropolitan area have declined by 15.0 to 20.0 ft during the 13-year period.

In spring 2001, the flow of water in the "1,500-foot" sand in the Baton Rouge area generally was downgradient from the recharge area toward pumping centers along the Mississippi River and in Baton Rouge (figs. 1, 4, 5). In East and West Feliciana and East Baton Rouge Parishes, flow generally was south to southwest toward areas of large withdrawals in East Baton Rouge Parish along the Mississippi River between wells EB-603 and EB-413. Ground-water flow in Baton Rouge (fig. 5) was toward the vicinity of well EB-477 where the average water-withdrawal rate was 5.71 mgd in 2000. Because the "1,500-foot" sand is offset at the Baton Rouge fault (Whitman, 1979, p. 12-13), withdrawals south of the fault have little effect on the potentiometric surface north of the fault.

SELECTED REFERENCES


--1984, Ground-water resources of East Feliciana and West Baton Rouge Parishes, Louisiana: Louisiana Department of Public Works, 70 p.


Figure 4. Potentiometric surface of the "1,500-foot" sand in the Baton Rouge area, southeastern Louisiana, spring 2001.

Table 1. Water-level data used to construct the potentiometric-surface map of the "1,500-foot" sand in the Baton Rouge area, southeastern Louisiana, spring 2001.

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<th>Latitude</th>
<th>Longitude</th>
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</table>

Figure 5. Potentiometric surface of the "1,500-foot" sand in parts of East and West Baton Rouge Parishes, southeastern Louisiana, spring 2001.