

INTRODUCTION

As a part of a program to monitor and document the potentiometric surfaces (water levels) of the major aquifers in Mississippi, the U.S. Geological Survey, in cooperation with the Mississippi Department of Environmental Quality, Office of Land and Water Resources, measures water levels in wells completed in the Coffee Sand aquifer in an 11-county study area in northeastern Mississippi at about 5-year intervals. This potentiometric-surface map, the third in the series for the Coffee Sand aquifer, is based on water-level data collected in 25 wells during the period from August through December 1987. Two previously published potentiometric-surface maps for the Coffee Sand aquifer were based on water-level measurements made during October and November 1978 (Wasson, 1980), and during November and December 1982 (Darden, 1985). Although potentiometric-surface contours shown in this report were based on water-level measurements made during a 5-month period in 1987 rather than during a 2-month period as in 1978 and 1982, the contours are considered representative of the potentiometric surface at a point in time because seasonal changes in the potentiometric surface were relatively small (less than 5 feet) when compared to long-term changes since the previous measurements.

HYDROGEOLOGY

The Coffee Sand is overlain by the Demopolis Chalk and underlain by the Eutaw Formation and is part of the Selma Group of late Cretaceous age (Belt and others, 1945). The Coffee Sand crops out in northeastern Mississippi in a north-south band that extends from Alcorn and Tishomingo Counties to Lee County (fig. 1). It generally consists of locally glauconitic and lignitic sand beds, interbedded clays, and irregular layers of sandstone. The water-bearing sands in the Coffee Sand compose the Coffee Sand aquifer. The aquifer grades laterally into the Mooreville Chalk and the lower part of the Demopolis Chalk where it extends south and southwest into Lee and Pontotoc Counties. The thickness of individual sand beds in the Coffee Sand ranges, for the most part, from a few inches to several feet but in some places is as much as 30 feet (Boswell, 1979). The total thickness of the Coffee Sand averages about 230 feet in Alcorn, Prentiss, Tippah, and Union Counties. The base of the aquifer slopes to the west and southwest at about 35 feet per mile, affecting the regional direction of groundwater flow (Darden, 1985). Precipitation on the outcrop-recharge area is the primary source of recharge to the Coffee Sand aquifer. Ground water moves downgradient generally to the west and southwest from the outcrop-recharge area.

GROUND-WATER USE

The Coffee Sand aquifer contains freshwater (water with dissolved-solids concentrations less than 1,000 milligrams per liter) in the study area except in western Lafayette County (Newcome, 1974). It is a source of freshwater for public, industrial, non-irrigation agricultural (livestock), domestic, and irrigation supplies. Water from the Coffee Sand aquifer is available in small quantities in its area of use and typically has higher sulfate and lower chloride concentrations than water from the underlying Eutaw-McShan aquifer (Boswell and others, 1965). Water use from the Coffee Sand aquifer in 1985 was estimated to be 2.4 Mgal/d (million gallons per day), which was less than 1 percent of the total ground water used in the State. Withdrawals from the aquifer were about 0.44 Mgal/d in Union County and 1.8 Mgal/d in Tippah County (data from U.S. Geological Survey National Water Data Storage and Retrieval System). The largest industrial withdrawals from the Coffee Sand aquifer occur at or near New Albany and Ripley.

ADDITIONAL INFORMATION

Data describing the individual wells used in this study may be obtained from the following:

Director  
Mississippi Department of Environmental Quality  
Office of Land and Water Resources  
P. O. Box 10631  
Jackson, Mississippi 39209

District Chief  
U.S. Geological Survey  
100 West Capitol Street, Suite 710  
Jackson, Mississippi 39269

Copies of this report can be purchased from:  
U.S. Geological Survey  
Books and Open-File Reports Section  
Box 25425, Federal Center  
Denver, Colorado 80225

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
foot	0.3048	meter
mile	1.609	kilometer
million gallons per day	0.04381	cubic meter per second

See level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a 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.

GROUND-WATER LEVELS

The altitudes of the potentiometric surface of the Coffee Sand aquifer generally decrease from the outcrop areas in the northeastern part of the study area to the west and southwest (fig. 1). Withdrawals for industrial and public supply in Union and Tippah Counties have lowered the potentiometric surface more than 20 feet since 1978 in parts of these two counties and in a small part of Alcorn County (fig. 2). Water-level trends in the Coffee Sand aquifer are evident from long-term records of water levels in observation wells. Water levels in many wells completed in the Coffee Sand aquifer had a slight downward trend with some annual and seasonal variations as a result of variations in precipitation and recharge. Typical hydrographs for wells completed in the Coffee Sand aquifer are presented in figure 3. Water levels in well G3 in Alcorn County had a general downward trend with some small yearly and seasonal fluctuations between 1978 and 1987. During the same period, water levels for well K53, also in Alcorn County, had a similar downward trend but available data indicated little yearly or seasonal fluctuation.

WATER-LEVEL CHANGES

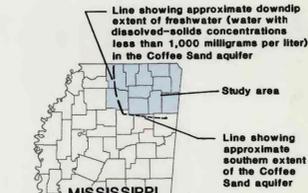
Changes in the potentiometric surface of the Coffee Sand aquifer during the 9-year period, 1978 to 1987, are shown in figure 2. This water-level change map is based not only on the changes in measured water levels in 23 observation wells but also on a comparison of the potentiometric-surface map for 1987 (fig. 1) with the previously published potentiometric-surface map for 1978 (Wasson, 1980).

Water levels in most wells in the downgradient part of the Coffee Sand aquifer were substantially lower during the period from August through December 1987 than during October and November 1978 (fig. 2). Water levels measured in wells located downgradient from the outcrop-recharge area declined at an average rate of about 1.6 feet per year between 1978 and 1987. During this period, water-level declines exceeded 20 feet in a few wells in or near areas of withdrawals for industrial and public supply. These areas of large declines in water levels are located in parts of Alcorn, Tippah, and Union Counties. The largest water-level declines generally were in Tippah and Union Counties. In Union County, a decline of 47 feet (representing an average decline of about 5 feet per year from 1978 to 1987) occurred in well B3, and a decline of 31 feet (an average decline of about 3 feet per year) occurred in well C7.

Although water levels in wells in the downgradient area of the Coffee Sand aquifer declined from 1978 to 1987, water levels in wells in some parts of the study area rose. Areas where water levels rose or remained unchanged between 1978 and 1987 generally are in or near the outcrop-recharge areas. Recharge from precipitation in 1987 may have contributed to water-level rises in these wells.

REFERENCES CITED

- Belt, W.E., and others, 1945, Geologic map of Mississippi, Mississippi Geological Society, Jackson, Mississippi, 1 sheet.  
Boswell, E.H., 1979, The Coffee Sand and Ripley aquifers in Mississippi, U.S. Geological Survey Water-Resources Investigations Report 78-114, map, 1 sheet.  
Boswell, E.H., Moore, C.K., MacCary, L.M., and others, 1965, Cretaceous aquifers in the Mississippi embayment, U.S. Geological Survey Professional Paper 448-C, 37 p.  
Darden, Daphne, 1985, Potentiometric map of the Coffee Sand aquifer in northeastern Mississippi, fall 1982, U.S. Geological Survey Water-Resources Investigations Report 85-4075, 1 sheet.  
Newcome, Roy, Jr., 1974, Water for industrial development in Benton, Lafayette, Marshall, Pontotoc, Tippah, and Union Counties, Mississippi Research and Development Center, Jackson, Mississippi, 73 p.  
Wasson, B.E., 1980, Potentiometric map of the Coffee Sand aquifer in northeastern Mississippi, October and November 1978, U.S. Geological Survey Water-Resources Investigations Open-File Report 79-1587, 1 sheet.



LOCATION MAP

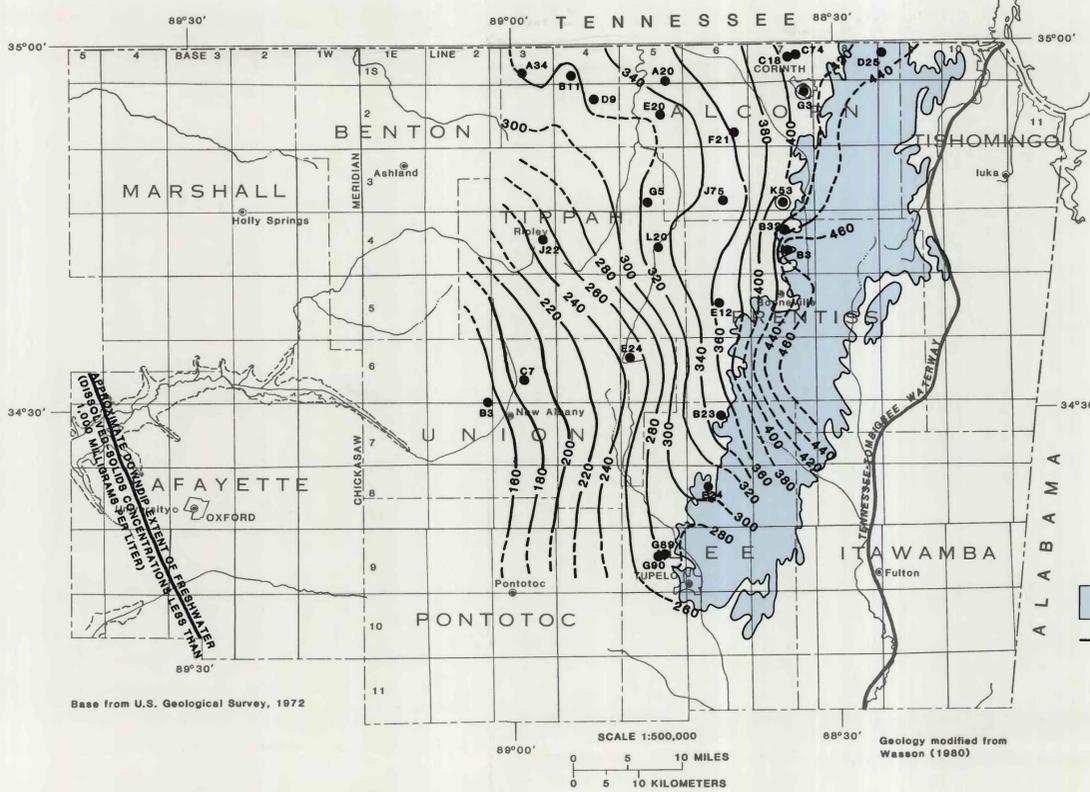


Figure 1.—Potentiometric surface of the Coffee Sand aquifer, August through December 1987.

EXPLANATION

- OUTCROP-RECHARGE AREA OF COFFEE SAND (COFFEE SAND AQUIFER) IN MISSISSIPPI
- AREA IN WHICH DECLINE IN POTENTIOMETRIC SURFACE EXCEEDS 20 FEET
- LINE OF EQUAL CHANGE IN POTENTIOMETRIC SURFACE—Shows rise (+) or decline (-) in potentiometric surface. Dashed where approximate. Interval 10 feet
- OBSERVATION WELL AND NUMBER—Wells are numbered alpha-numerically

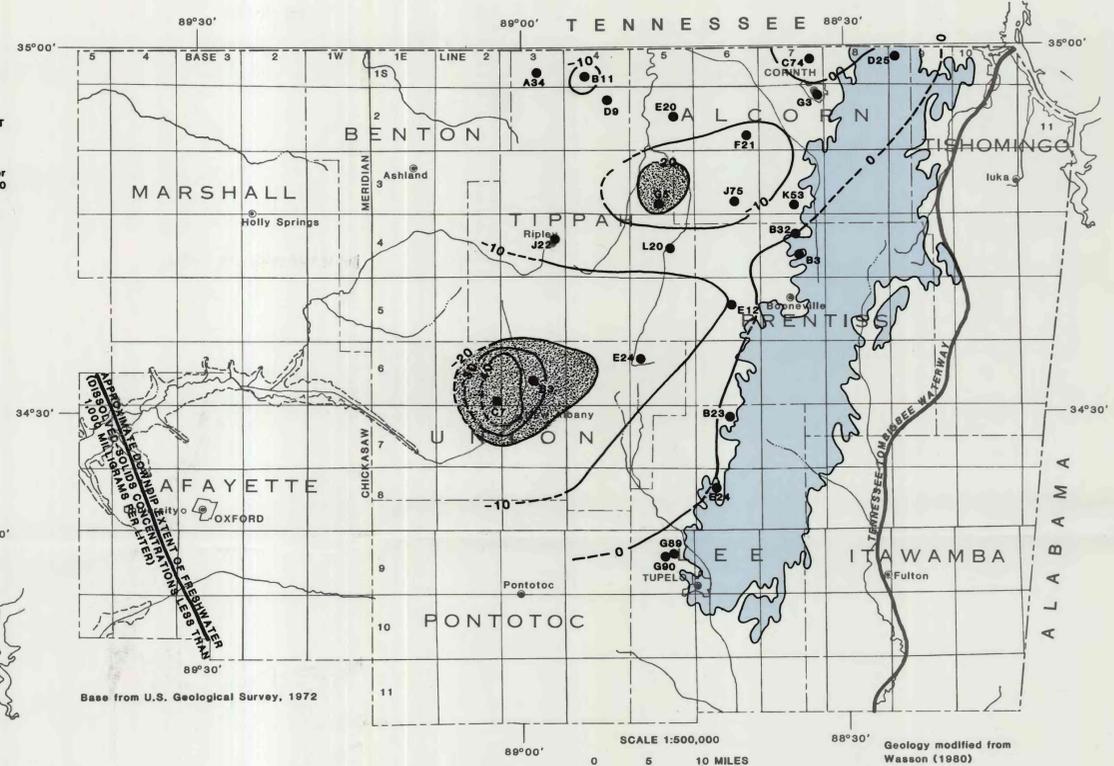


Figure 2.—Changes in the potentiometric surface of the Coffee Sand aquifer from October through November 1978 to August through December 1987.

EXPLANATION

- OUTCROP-RECHARGE AREA OF COFFEE SAND (COFFEE SAND AQUIFER) IN MISSISSIPPI
- POTENTIOMETRIC CONTOUR—Shows altitude at which water level would have stood in tightly cased, unpumped wells. Dashed where approximate. Contour interval 20 feet. Datum is sea level
- A20 ● OBSERVATION WELL AND NUMBER—Wells numbered alpha-numerically by county
- K53 ● OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN IN FIGURE 3

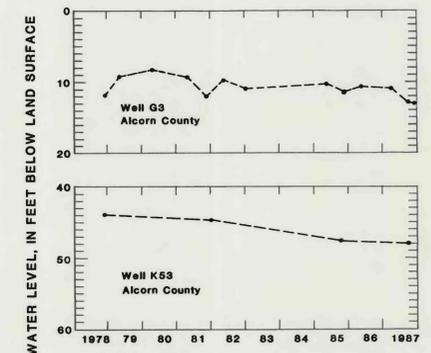


Figure 3.—Water levels in selected wells completed in the Coffee Sand aquifer, 1978-87.

POTENTIOMETRIC-SURFACE MAP OF THE COFFEE SAND AQUIFER IN NORTHEASTERN MISSISSIPPI, AUGUST THROUGH DECEMBER 1987

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1991