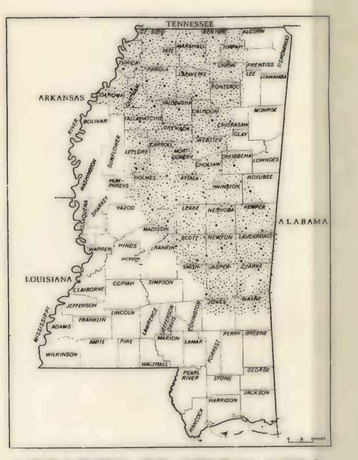
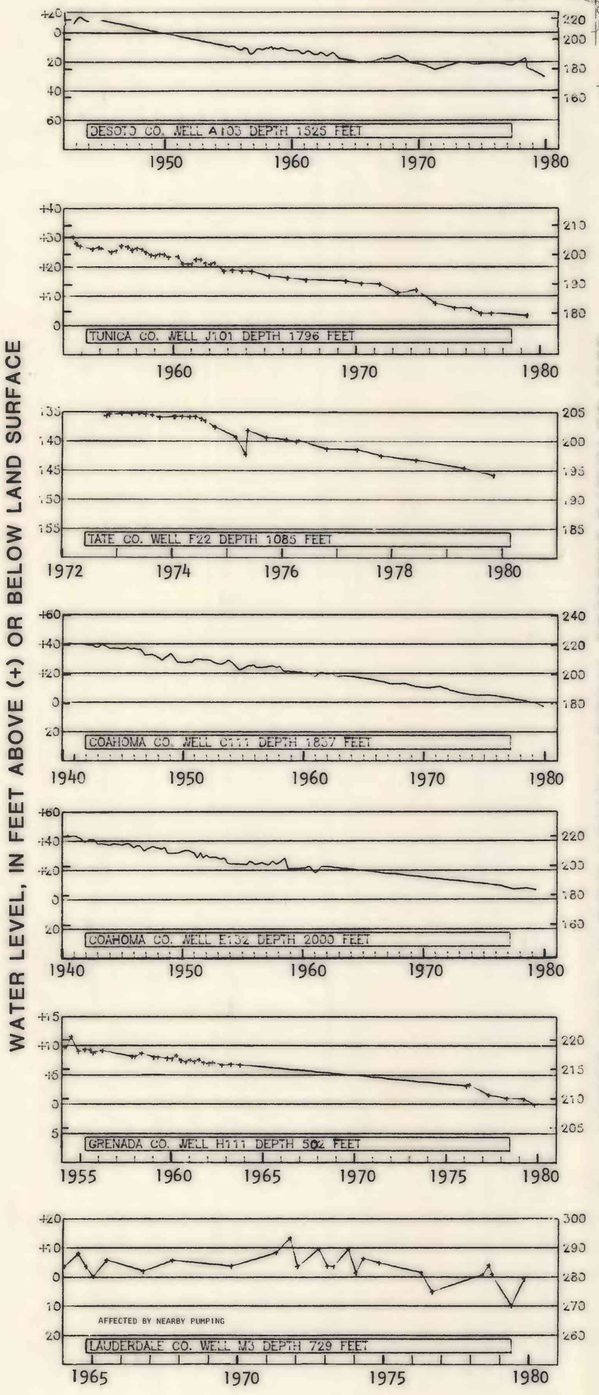
Department of the Interior
United States Geological Survey

Prepared in cooperation with the
Mississippi Department of Natural Resources
Bureau of Land and Water Resources

WATER-RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 80-597



LOCATION OF STUDY AREA IN MISSISSIPPI



HYDROGRAPHS OF WELLS
IN THE LOWER WILCOX AQUIFER

(See map for locations. Note that vertical and horizontal scales vary. Straight lines connect data points. Data points represent periodic water-level measurement, generally made with steel tape.)

POTENTIOMETRIC MAP OF THE LOWER WILCOX AQUIFER IN MISSISSIPPI, FALL 1979

The potentiometric map of the lower Wilcox aquifer is the sixth in a series of maps, prepared by the U.S. Geological Survey in cooperation with the Mississippi Department of Natural Resources, Bureau of Land and Water Resources, delineating the potentiometric surfaces of the major aquifers in Mississippi. This map is based on water-level measurements made in more than 100 wells during the fall of 1979, on 17 measurements made prior to 1979, on 11 measurements made in Arkansas and Tennessee in 1979 (not shown on map), and on water-surface altitudes determined at several points on streams in or near the outcrop area of the aquifer.

From the outcrop area, the base of the lower Wilcox aquifer dips 20 to 50 feet per mile to the west and southwest. (Refer to adjacent map for outcrop and to Boswell (1976) for structure contour map and more geologic detail.) Aquifer thickness increases from about 100 feet in the central part of the study area to about 400 feet in the southern and northern parts of the study area. Primary recharge of the aquifer is from precipitation in the outcrop area. Mineralization of the water increases down the dip of the aquifer. The downdip limit of freshwater (less than 1,000 milligrams per liter of dissolved solids) is 50 to 80 miles southwest of the outcrop area. (See downdip limit of freshwater on potentiometric map.)

The lower Wilcox aquifer consists of beds of sand in the lower part of the Wilcox Group of Paleocene and Eocene ages (Boswell, 1976). Beds of clay that commonly occur above the lower Wilcox aquifer restrict vertical movement of water between the middle sands of the Wilcox Group and the lower Wilcox aquifer. Water levels commonly are higher in the beds of sand in the middle of the Wilcox Group than water levels in the lower Wilcox aquifer. The lower Wilcox aquifer is separated from the underlying Cretaceous aquifers by the Paleocene Porters Creek Clay, a thick and tight confining bed.

Well depths increase down the dip of the aquifer from less than 200 feet in the outcrop area to about 2,300 feet near the downdip limit of freshwater. South of Winston County and northwest of Panola County, the lower Wilcox aquifer commonly will yield 1,000 gallons per minute of water to properly designed and constructed wells; however, in the central part of the study area, the aquifer is characterized by much lower yields to wells. The lower Wilcox is an important source or potential source of water in 30 counties.

The potentiometric surface of the lower Wilcox slopes downward generally to the west away from the outcrop area, but it is strongly influenced by public and industrial pumpage in several areas in northwestern Mississippi. (See potentiometric map.) This pumpage has caused a large shallow depression in the potentiometric surface in the Marks-Batesville-Charleston-Tunica area. Smaller cones of depression occur in the Senatobia, Grenada, and Weir areas. In the outcrop area of the lower Wilcox, the potentiometric surface is strongly affected by topography, drainage of the aquifer by streams, and recharge from precipitation. A combination of those factors cause a mound in the potentiometric surface between Ackerman and Dekalb.

Historically, water levels in or near the outcrop of the lower Wilcox aquifer have shown little or no long-term changes. Heavy withdrawals from the downdip part of the aquifer have caused long-term water-level declines of 1 to 2 feet per year in much of the confined part of the aquifer. (See hydrographs.)

Other potentiometric maps in this series are included in the Selected References as is additional information on the geohydrology of the lower Wilcox aquifer.

EXPLANATION

AREA OF OUTCROP OF LOWER WILCOX AQUIFER (Boswell, 1976).

POTENTIOMETRIC CONTOUR--Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Contour interval is 20 feet. Datum is National Geodetic Vertical Datum of 1929. Based on measurements of water-level altitudes in wells and on water-surface altitudes of streams in and near outcrop area.

A12 — OBSERVATION WELL AND NUMBER--Wells are numbered alpha-numberically by county. Several wells were not measured during the fall of 1979; the dates of these measurements are shown in parentheses.

H111 — OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN.

310 — POINT AT WHICH ALTITUDE OF WATER SURFACE IN STREAM DURING FALL WAS USED TO DEFINE THE POTENTIOMETRIC SURFACE OF AQUIFER. Number is approximate altitude of water surface in feet.

DOWNDIP LIMIT OF FRESHWATER IN THE LOWER WILCOX AQUIFER (BOSWELL, 1976)

10 0 10 Miles

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1980a, Potentiometric map of the Eutaw-McShan aquifer in northeastern Mississippi, September, October, and November 1978: U.S. Geological Survey Water-Resources Investigations 79-1584, map, 1 sheet.

1980b, Potentiometric map of the Ripley aquifer in northeastern Mississippi, October, and November 1978: U.S. Geological Survey Water-Resources Investigations 79-1585, map, 1 sheet.

1980c, Potentiometric map of the Gordo aquifer in northeastern Mississippi, September, October, and November 1978: U.S. Geological Survey Water-Resources Investigations 79-1586, map, 1 sheet.

1980d, Potentiometric map of the Coffee Sand aquifer in northeastern Mississippi, October and November 1978: U.S. Geological Survey Water-Resources Investigations 79-1597, map, 1 sheet.

1980e, Potentiometric map of the Meridian-upper Wilcox aquifer in Mississippi, Fall 1979: U.S. Geological Survey Water-Resources Investigations 80-590, map, 1 sheet.

1980f, Potentiometric map of the Winona-Tallahatta aquifer in Northwestern Mississippi, Fall 1979: U.S. Geological Survey Water-Resources Investigations 80-598, map, 1 sheet.

Base map from U. S. Geological Survey Map of Mississippi, 1978.

POTENTIOMETRIC MAP OF THE LOWER WILCOX AQUIFER IN MISSISSIPPI, FALL 1979

B. E. WASSON

1980

JACKSON, MISSISSIPPI