United States Geological Survey
Department of the Interior

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

WATER RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 80-590

POTENTIOMETRIC MAP OF THE MERIDIAN-UPPER WILCOX AQUIFER IN MISSISSIPPI, FALL 1979

The potentiometric map of the Meridian-upper Wilcox aquifer is the seventh 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 175 wells during the fall of 1979, on four measurements made prior to 1979, and on water-surface altitudes determined at several points on streams in or near the outcrop area of the aquifer.

The base of the Meridian-upper Wilcox aquifer dips 20 to 50 feet per mile to the southwest away from the outcrop area. (Refer to adjacent map for outcrop area and to Boswell (1976) for structure contour map and more geologic detail.) The aggregate sand thickness of the aquifer increases from less than 50 feet in the eastern part of Attala County to more than 400 feet in much 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 30 to 80 miles southwest of the outcrop area. (See downdip limit of freshwater on potentiometric map.)

The Meridian-upper Wilcox aquifer consists of beds of Eocene sand in the Meridian Sand Member of the Tallahatta Formation and in the upper part of the Wilcox Group (Boswell, 1976). Beds of clay that commonly occur above and below the Meridian-upper Wilcox aquifer restrict vertical movement of water either into or out of the aquifer; however, in some areas this separation is poor and water levels in the Meridian-upper Wilcox influence or are influenced by water levels in the Winona-Tallahatta aquifer above and by water levels in beds of sand in the middle of the Wilcox Group below.

Near the outcrop areas, the potentiometric surface of the Winona-Tallahatta aquifer commonly is more than 50 feet higher than that of the Meridian-upper Wilcox aquifer, but down the dip this difference generally is less. The confining beds between the Winona-Tallahatta and Meridian-upper Wilcox aquifers thin to the north and in extreme northwestern Mississippi both aquifers are part of the Memphis aquifer.

Well depths increase from less than 100 feet in the outcrop area to about 2,100 feet near the downdip limit of freshwater. The aquifer commonly will yield 1,000 gallons per minute of water to properly designed and constructed wells, except in the Quitman-Tallahatchie Counties area where the aquifer is characterized by much lower yields to wells. The Meridian-upper Wilcox is an important source or potential source of water in 35 counties.

The potentiometic surface of the Meridian-upper Wilcox aquifer slopes downward generally to the west away from the outcrop area, and it is strongly influenced by large ground-water withdrawals in the Greenwood, Indianola, Marks, Grenada, and Memphis areas. (See potentiometric map.) In the outcrop area, the potentiometric surface is strongly affected by topography, drainage of the aquifer by streams, and recharge from precipitation.

Historically, water levels in or near the outcrop of the Meridian-upper Wilcox aquifer have shown little or no long-term changes. (See hydrographs of Grenada County wells B103 and H113.) The water level in Grenada County well B103 is affected by the water level in Grenada Lake. Heavy withdrawals 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.) Previous potentiometric maps of large parts of the Meridian-upper Wilcox aquifer were made by Brown (1947) and Boswell (1976).

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

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_____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 79-1587, map, 1 sheet.

_____1980e, Potentiometric map of the Ripley aquifer in Mississippi, Fall 1979: U.S. Geological Survey Water-Resources Investigations 80-597, map, 1 sheet.

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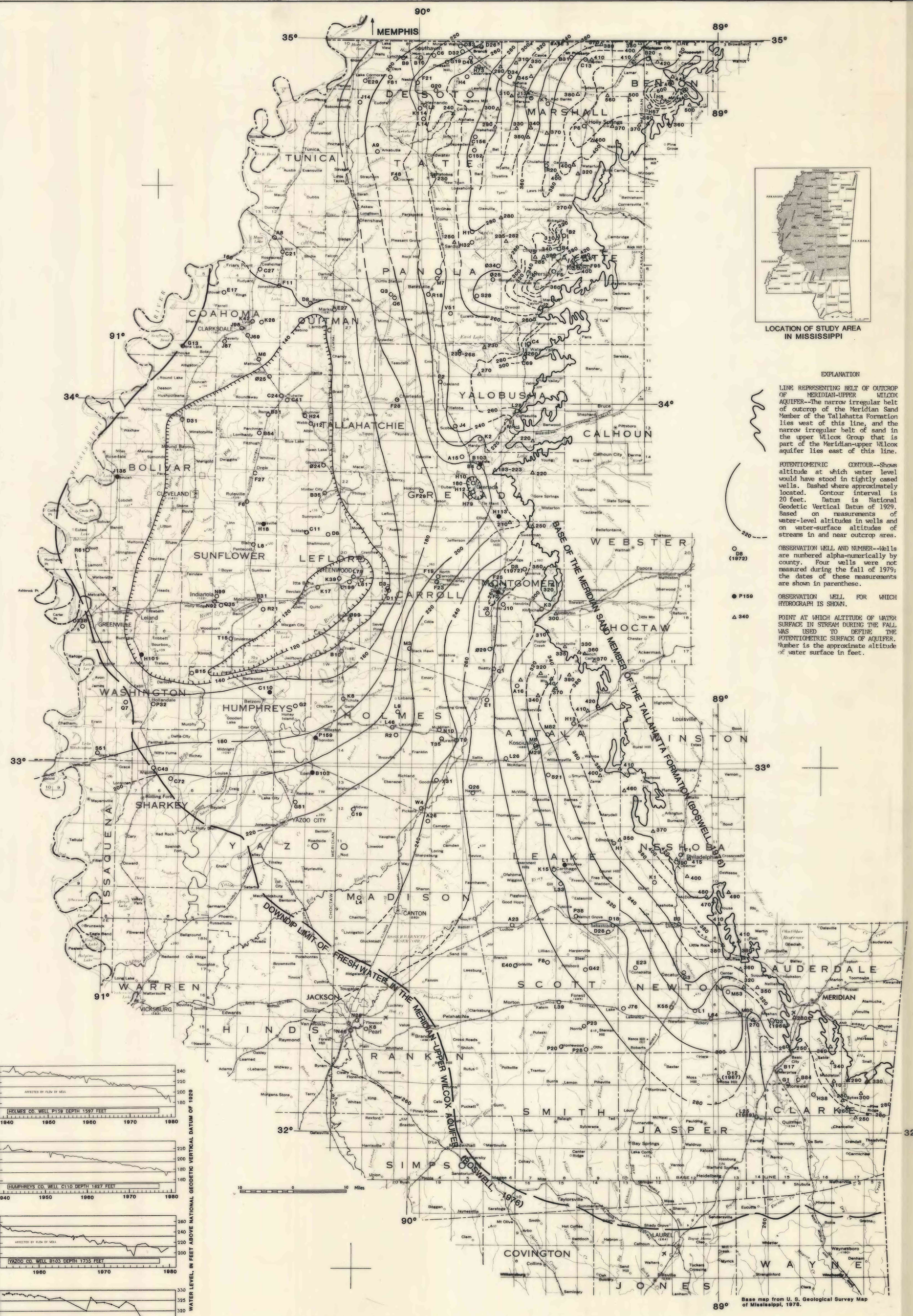


Base map from U. S. Geological Survey Map of Mississippi, 1978.

LOCATION OF STUDY AREA IN MISSISSIPPI

EXPLANATION

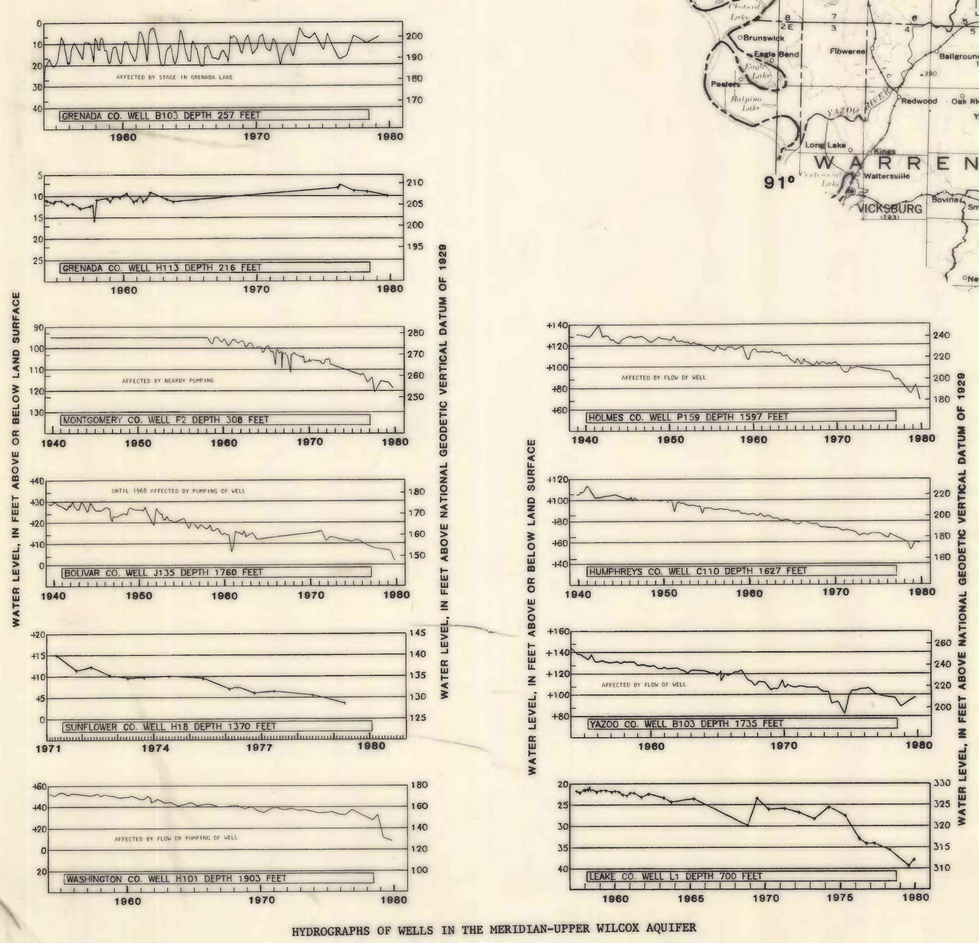
LINE REPRESENTING BELT OF OUTCROP OF MERIDIAN-UPPER WILCOX AQUIFER--The narrow irregular belt of outcrop of the Meridian Sand Member of the Tallahatta Formation lies west of this line, and the narrow irregular belt of sand in the upper Wilcox Group that is part of the Meridian-upper Wilcox aquifer lies east of this line.

220 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.

D8 (1972) OBSERVATION WELL AND NUMBER--Wells are numbered alpha-numerically by county. Four wells were not measured during the fall of 1979; the dates of these measurements are shown in parenthese.

P159 OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN.

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



HYDROGRAPHS OF WELLS IN THE MERIDIAN-UPPER WILCOX AQUIFER

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

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B. E. WASSON

1980

JACKSON, MISSISSIPPI