

POTENTIOMETRIC MAP OF THE WINONA-TALLAHATTA AQUIFER IN NORTHWESTERN MISSISSIPPI, FALL 1979

The potentiometric map of the Winona-Tallahatta aquifer is the eighth 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 35 wells during the fall of 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 Winona-Tallahatta aquifer dips 25 to 50 feet per mile to the southwest away from the outcrop area. (Refer to adjacent map for outcrop area and to Spiers (1977) for structure contour map and more geologic detail.) Aquifer thickness increases from about 100 feet in the southeastern part of the outcrop area to about 400 feet in much of northwestern Mississippi. Primary recharge of the aquifer is from precipitation in the outcrop area. Mineralization of the water increases down the dip of the aquifer. The limit of freshwater (less than 1,000 milligrams per liter of dissolved solids) is 25 to 80 miles downdip from the outcrop area. (See downdip limit of freshwater on potentiometric and location maps.)

The Winona-Tallahatta aquifer consists of beds of Eocene sand in the Winona Sand and in the underlying Neshoba Sand and Basic City Shale Members of the Tallahatta Formation. The beds of clay that commonly occur above and below the Winona-Tallahatta aquifer restrict vertical movement of water either into or out of the aquifer.

The confining beds above and below the Winona-Tallahatta aquifer thin to the north. The overlying Zilpha Clay, which confines the aquifer in the southern two-thirds of the area, thins to the north from Grenada and loses its identity in the Memphis, Tennessee area. In northwestern Mississippi, where confining beds are thin or absent, the Sparta, Winona-Tallahatta, and Meridian-upper Wilcox aquifers are part of the Memphis aquifer.

Well depths increase from less than 100 feet in the outcrop area to about 1,900 feet near the downdip limit of freshwater. The aquifer commonly yields less than 300 gallons per minute of water to wells. The Winona-Tallahatta aquifer is an important source of water in 27 counties.

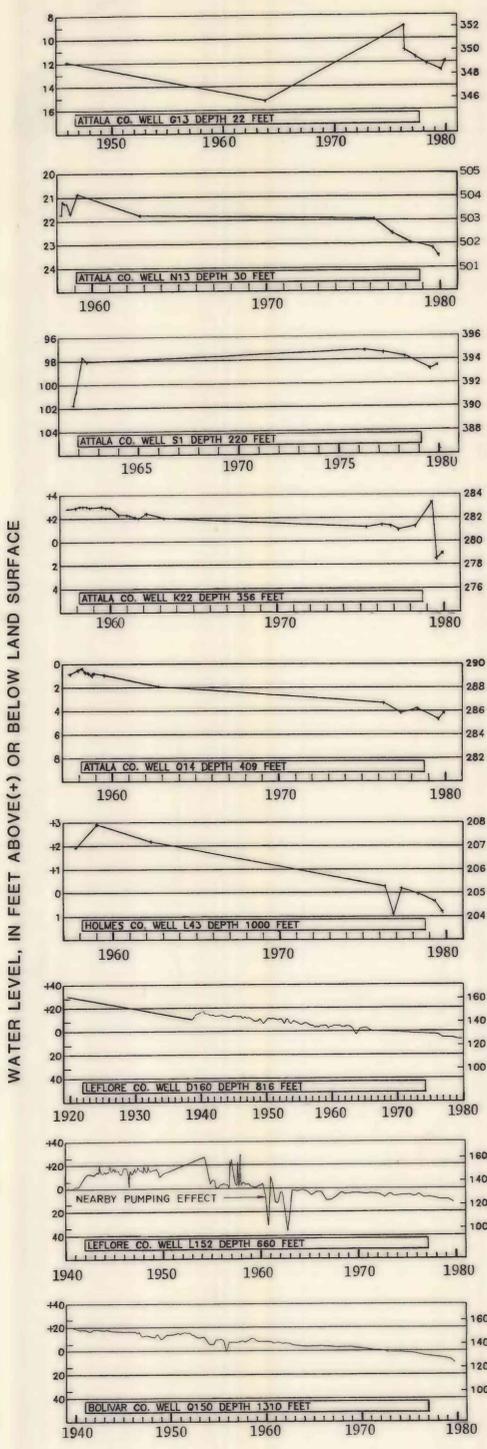
The potentiometric surface of the Winona-Tallahatta aquifer slopes downward generally to the west away from the outcrop area, and it is strongly influenced by ground-water withdrawals in Leflore, Sunflower, and Bolivar Counties. (See potentiometric map). In this area, the altitude of the potentiometric surface of the Winona-Tallahatta aquifer is similar to that of the underlying Meridian-upper Wilcox aquifer. 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 Winona-Tallahatta aquifer have shown little or no long-term changes. (See hydrographs of Attala County wells NI3 and G13.) Heavy withdrawals in the confined part of the aquifer have caused long-term water-level declines of 1 to 2 feet per year. (See hydrographs.) Previous potentiometric maps of large parts of the Winona-Tallahatta aquifer were made by Brown (1947) and Spiers (1977).

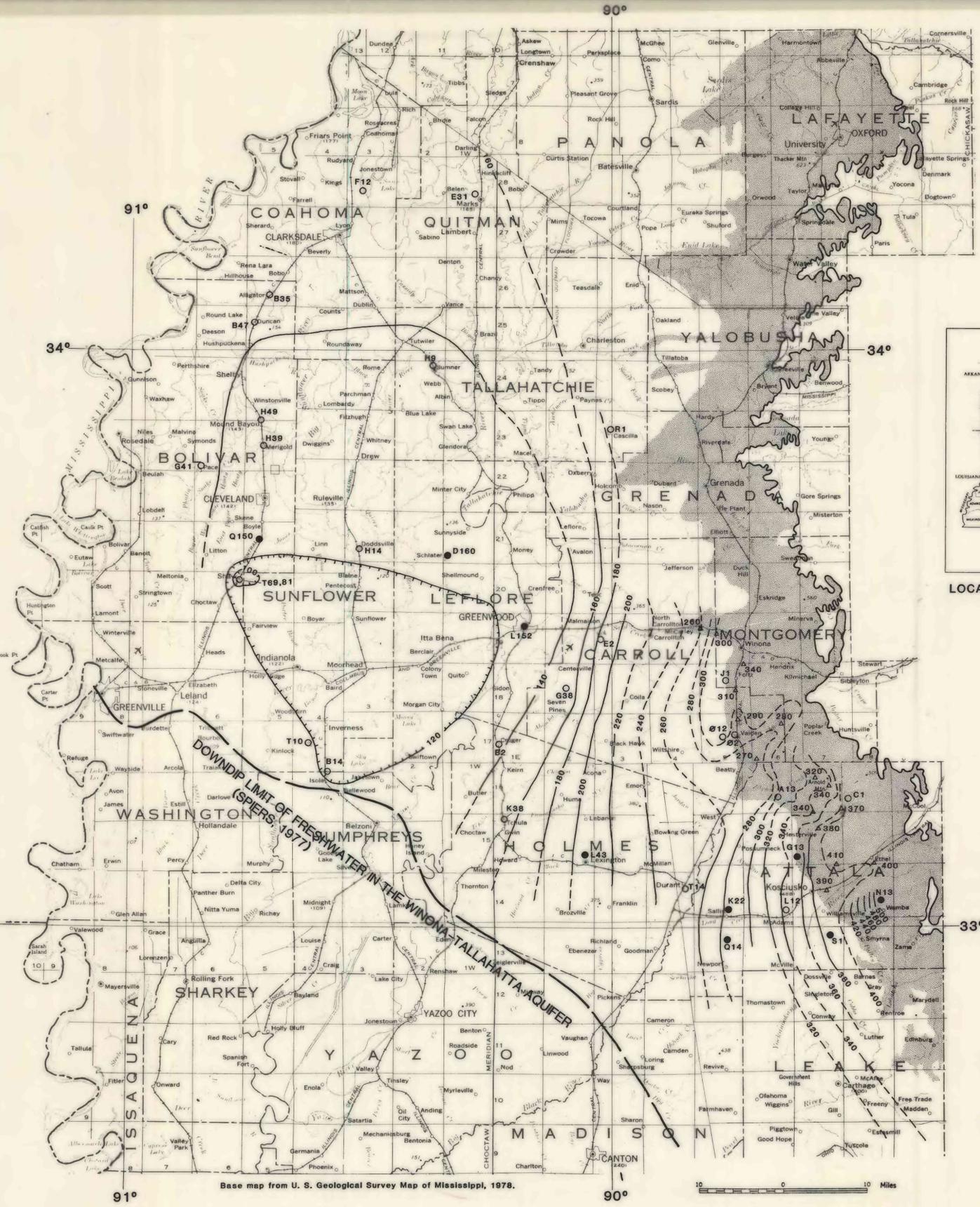
Other potentiometric maps in this series are included in the Selected References as is additional information on the hydrogeology of the Winona-Tallahatta aquifer.

SELECTED REFERENCES

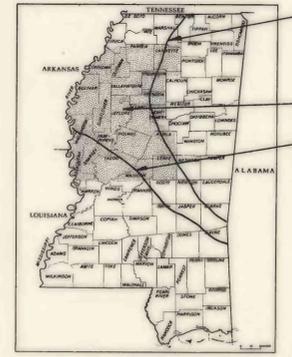
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HYDROGRAPHS OF WELLS IN THE WINONA-TALLAHATTA AQUIFER (See map for locations. Note that vertical and horizontal scales vary. Straight lines connect data points. Data points represent periodic water-level measurements, generally made with steel tape.)



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



LOCATION OF STUDY AREA IN MISSISSIPPI

LINE SHOWING APPROXIMATE UPDIP LIMIT OF AQUIFER
STUDY AREA
LINE SHOWING DOWNDIP LIMIT OF FRESHWATER IN THE WINONA-TALLAHATTA AQUIFER

EXPLANATION
AREA OF OUTCROP OF WINONA-TALLAHATTA AQUIFER—Generalized from Spiers (1977) and Belt and others (1945). Includes Meridian Sand Member of Tallahatta Formation in eastern edge of outcrop belt.
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.

OBSERVATION WELL AND NUMBER—Wells are numbered alpha-numerically by county.
OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN.

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

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1980