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 79-1584

POTENTIOMETRIC MAP OF THE EUTAW-MCSHAN AQUIFER IN NORTHEASTERN MISSISSIPPI, SEPTEMBER, OCTOBER, AND NOVEMBER 1978

This potentiometric map of the Eutaw-McShan aquifer is the third 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 about 190 wells during September, October, and November 1978 and on water-surface altitudes determined at several points on streams in or near the outcrop area of the aquifer. The altitudes of the water surfaces in the streams were determined from topographic maps and were not field checked.

The Eutaw-McShan aquifer of the Cretaceous age commonly includes many relatively thin water-bearing beds of sand interbedded with thin beds of clay, the whole of which acts as one lenticular aquifer (see Boswell, 1977). From its outcrop area the aquifer (see outcrop area on map) dips about 30 feet per mile to the west and southwest. Thickness of the aquifer commonly is between 200 and 300 feet in most of the area, and usually about one-half this thickness consists of sand. Depths of wells in the aquifer range from less than 100 feet in the outcrop area to about 2,000 feet in the western part of the aquifer. Wells tapping the aquifer generally produce less than 500 gallons per minute of water.

The Eutaw-McShan aquifer contains freshwater (contains less than 1,000 milligrams per liter of dissolved solids) as far as 60 miles downdip from the outcrop area (see index and potentiometric maps).

The Eutaw-McShan potentiometric map shows the shape of the potentiometric surface for the upper or Eutaw Formation part of the Eutaw-McShan aquifer. Commonly, the differences between the static heads in the upper and lower water-bearing zones of the Eutaw-McShan aquifer are less than 20 feet; however, at West Point, where pumpage from the Eutaw Formation is large, static heads in the upper or Eutaw Formation part of the aquifer are more than 70 feet lower than in the underlying McShan Formation.

In the outcrop area of the Eutaw-McShan aquifer the potentiometric surface is strongly affected by recharge from precipitation, topography, and drainage of the aquifer by streams. The potentiometric surface of the aquifer slopes generally to the west away from the area of outcrop and it is strongly affected by large ground-water withdrawals at or near Tupelo, Aberdeen, and West Point (see potentiometric map).

Historically, water levels in or near the outcrop of the Eutaw-McShan aquifer have shown little or no long-term changes. Withdrawals of water by wells from the downdip area have caused long-term water-level declines of 1 to 2 feet per year in much of the confined part of the aquifer. Water-level declines during recent years in several observation wells in Lee County ranged from 2 to 9 feet per year (see hydrographs). The hydrograph of well H7 in Clay County, which is near the center of the depression in the potentiometric surface at West Point, shows about 5 feet per year of water-level decline since 1972.

Additional information on the geohydrology of the Eutaw-McShan aquifer may be found in the following reports:

SELECTED REFERENCES

Boswell, E. H., 1963, Cretaceous aquifers of northeastern Mississippi: Mississippi Board of Water Commissioners Bulletin 63-10, 202 p.

Boswell, E. H., 1977, The Eutaw-McShan aquifer in Mississippi: U.S. Geological Survey Water-Resources Investigations 76-134, map.

Newcome, Roy, Jr., 1974, Water for industrial development in Benton, Lafayette, Marshall, Pontotoc, Tippah, and Union Counties, Mississippi: Mississippi Research and Development Center Bulletin, 73 p.

Newcome, Roy, Jr., and Bettandorff, J. M., 1973, Water for industrial development in Calhoun, Chickasaw, Choctaw, Grenada, Montgomery, Webster, and Yalobusha Counties, Mississippi, with a discussion on the quality of the water in Grenada Lake by D. E. Shattles: Mississippi Research and Development Center Bulletin, 64 p.

Speer, P. R., Golden, H. G., and Patterson, J. F., 1964, Low-flow characteristics of streams in the Mississippi Embayment in Mississippi and Alabama: U.S. Geological Survey Professional Paper 448-I, 47 p.

Taylor, R. E., and Thomson, F. H., 1972, Water for industrial development in Kemper, Leake, Neshoba, Noxubee, and Winston Counties, Mississippi: Mississippi Research and Development Center Bulletin, 63 p.

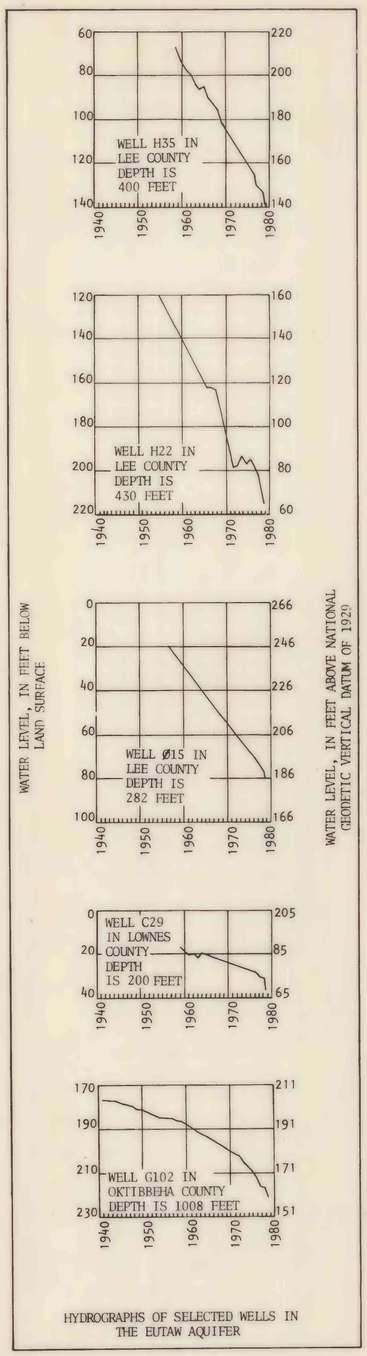
Wasson, B. E., Golden, H. G., and Gaydos, M. W., 1965, Available water for industry--Clay, Lowndes, Monroe, and Oktibbeha Counties, Mississippi: Mississippi Research and Development Center Bulletin, 39 p.

Wasson, B. E., and Tharpe, E. J., 1975, Water for industrial development in Alcorn, Itawamba, Prentiss, and Tishomingo Counties, Mississippi: Mississippi Research and Development Bulletin, 60 p.

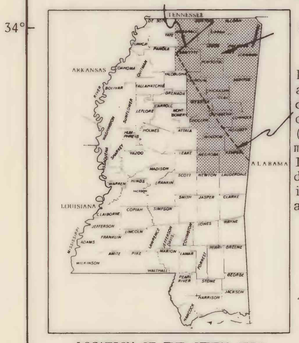
Wasson, B. E., and Thomson, F. H., 1970, Water resources of Lee County, Mississippi: U.S. Geological Survey Water-Supply Paper 1899-B, 63 p.

POTENTIOMETRIC MAP OF THE EUTAW-McSHAN AQUIFER IN NORTHEASTERN MISSISSIPPI, SEPTEMBER, OCTOBER, AND NOVEMBER 1978

B. E. WASSON
1980



HYDROGRAPHS OF SELECTED WELLS IN THE EUTAW AQUIFER



LOCATION OF THE STUDY AREA IN MISSISSIPPI

Geology modified from Speer, Golden and Patterson, 1964

Base map modified from U.S. Geological Survey Map of Mississippi, 1972

EXPLANATION

AREA OF OUTCROP OF EUTAW AND McSHAN FORMATIONS (Eutaw-McShan aquifer).

260 — 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 water-surface altitudes of streams in and near outcrop area.

○ G86 — OBSERVATION WELL AND NUMBER--Wells are numbered alpha-numerically by county.

● Ø15 — OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN.

△ — POINT AT WHICH ALTITUDE OF WATER SURFACE IN STREAM WAS USED TO DEFINE THE POTENTIOMETRIC SURFACE OF AQUIFER.

JACKSON, MISSISSIPPI