

POTENTIOMETRIC MAP OF THE GORDO AQUIFER
IN NORTHEASTERN MISSISSIPPI,
SEPTEMBER, OCTOBER, AND NOVEMBER 1978

This potentiometric map of the Gordo aquifer is the second 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 150 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 base of the Gordo aquifer of Upper Cretaceous age dips about 30 feet per mile to the southwest away from the outcrop area (see map). Thickness of the aquifer increases from less than 50 feet in the northwestern part of the aquifer (see extent of aquifer line on potentiometric map) to about 400 feet in the southern part 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 extent of freshwater (less than 1,000 milligrams per liter of dissolved solids) is about 60 miles southwest of the outcrop area (see downdip extent of freshwater on potentiometric and location maps.)

The Gordo aquifer consists of beds of sand or sand and gravel in the lower part of the Gordo Formation of the Tuscaloosa Group (Boswell, 1979). The beds of clay that commonly occur above and below the Gordo aquifer tend to prevent vertical movement of water either into or out of the aquifer; however, in some areas this separation is poor and water levels in the Gordo influence or are influenced by water levels in the McShan Formation above and by water levels in the Coker Formation below.

Well depths increase southwestward from less than 200 feet in the outcrop area to about 2,400 feet near the downdip extent of freshwater. South of Tupelo the Gordo aquifer commonly will yield 1,000 gallons per minute of water to properly designed and constructed wells; north of Tupelo the aquifer is characterized by much lower yields to wells. The Gordo aquifer is an important source or potential source of water in 16 counties.

The basal sand of the Coker Formation is a major aquifer that underlies the southern part of the Gordo aquifer; however, a potentiometric map of the Coker aquifer was not prepared because water-level data could be obtained at only a few locations. The few water-level measurements in the Coker indicate that the static head of the Coker commonly is about the same to 20 feet higher than that of the Gordo, except in the Columbus area where the potentiometric surface of the Coker is about 60 feet higher than that of the Gordo.

The potentiometric surface of the Gordo aquifer slopes generally to the west away from the outcrop area and it is strongly influenced by large ground-water withdrawals in the Tupelo and Columbus areas (see potentiometric map). In the outcrop area of the Gordo 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 Gordo aquifer have shown little or no long-term changes. Heavy withdrawals 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 (see hydrographs). Water-level decline in one observation well in Tupelo has averaged about 5 feet per year since 1966 (see hydrograph of well H42 in Lee County).

Additional information on the geohydrology of the Gordo 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., 1979, The Tuscaloosa aquifer system in Mississippi: U.S. Geological Survey Water-Resources Investigations 78-98, 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.

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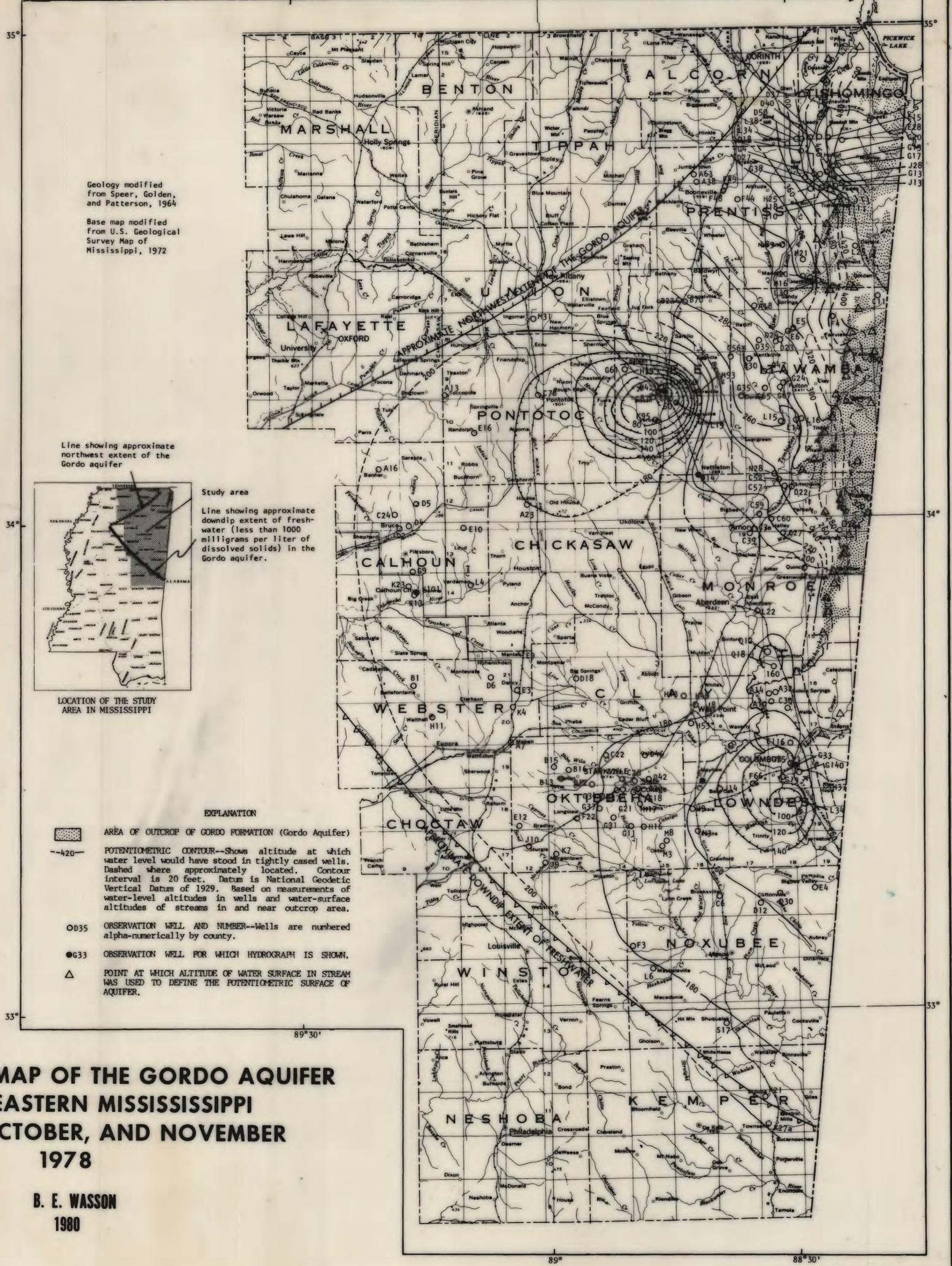
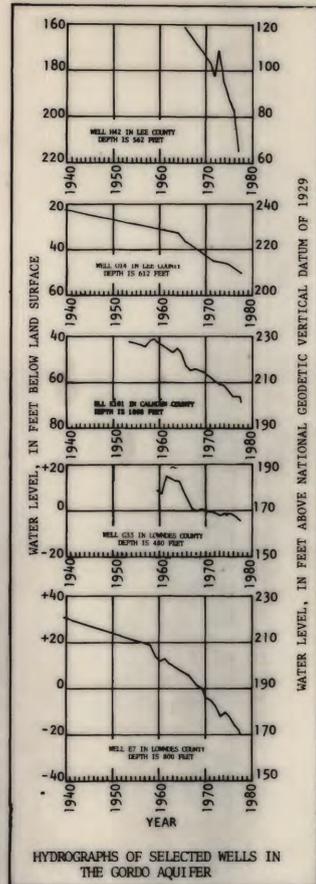
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Taylor, R. E., and Thomson, F. H., 1972, Water for industrial development in Kemper, Leake, Neshoba, Noxubee, and Winston Counties, Mississippi: Mississippi Research and Development Center Bulletin, 63 p.

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

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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.



Geology modified from Speer, Golden, and Patterson, 1964
Base map modified from U.S. Geological Survey Map of Mississippi, 1972

Line showing approximate northwest extent of the Gordo aquifer



LOCATION OF THE STUDY AREA IN MISSISSIPPI

Study area
Line showing approximate downdip extent of freshwater (less than 1000 milligrams per liter of dissolved solids) in the Gordo aquifer.

- EXPLANATION
- AREA OF OUTCROP OF GORDO FORMATION (Gordo Aquifer)
 - 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.
 - 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 WAS USED TO DEFINE THE POTENTIOMETRIC SURFACE OF AQUIFER.

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