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 Report 83-4254

POTENTIOMETRIC MAP OF THE GORDO AQUIFER IN NORTHEASTERN MISSISSIPPI, NOVEMBER AND DECEMBER 1982

by Daphne Darden

The U.S. Geological Survey, in cooperation with the Mississippi Department of Natural Resources, Bureau of Land and Water Resources, has prepared a series of maps of major aquifers in Mississippi to show the availability of ground water for municipal and industrial use and to show the effects of withdrawals on the aquifer. This map, the second in the series for the Gordo aquifer, follows a map that delineated the potentiometric surface of the aquifer in 1978 (Wasson, 1980).

The Gordo aquifer is composed of chert gravel and sand in the lower part of the Gordo Formation of the Tuscaloosa Group of Late Cretaceous age. The aquifer is less than 50 feet in thickness in Prentiss County in northeastern Mississippi and increases to as much as 100 feet in thickness in the southern part of the area near the downdip limit of freshwater. An upper clay unit confines the aquifer. The base of the Gordo aquifer dips about 30 feet per mile to the southwest. In the northern part of the study area, Paleozoic rocks underlie the aquifer. In the southern part of the study area, the aquifer is underlain by the Coker Formation also of the Tuscaloosa Group. The basal sand of the Coker Formation forms the Coker aquifer.

Precipitation recharges the Gordo aquifer in the outcrop area in Monroe, Itawamba, Prentiss, and Tishomingo Counties, and in adjacent parts of Alabama. The regional ground-water movement, southwestward into the subsurface from the outcrop area, has been modified by large centers of pumping at Tupelo and Columbus. As water moves down the dip from the outcrop, mineralization increases. The approximate downdip extent of freshwater in the Gordo aquifer, about 60 miles southwest of the outcrop area, marks a boundary of this map.

In northeastern Mississippi the Gordo aquifer contains freshwater (less than 1,000 milligrams per liter of dissolved solids) in an area of about 8,000 square miles. The aquifer is the source of ground water for most of the large industrial and municipal wells and many domestic and stock wells. This water-level map is based on water-level measurements made in about 120 wells in the Gordo aquifer in November and December 1982, and on the altitudes of water surfaces in some streams. Water-level measurements made in nearby wells in Alabama, not shown on this map, provided additional control. The contours show altitudes at which water levels would have stood in tightly cased unpumped wells in November and December 1982.

In and near the outcrop area, water levels in the Gordo aquifer have continued stable since 1978. Where wells are sparse and withdrawals are small in the west and southwest, water levels have declined about 2 feet per year. The largest declines, about 5 feet per year, have occurred in the Tupelo area. The cone of depression at Tupelo has expanded areally and has generally deepened about 5 feet per year since 1978, reflecting withdrawals by new wells located away from the center of pumping. The center of the cone, however, has been marked by a rise in water levels (see hydrograph for well H42) as a result of a reduction in pumping from old municipal wells and by a large industry. Water levels in the Columbus area have continued to decline moderately.

Owing to the sparcity of wells in the Coker aquifer, it is impractical to prepare a Coker potentiometric map. Generally, water levels in the Coker aquifer are a few feet higher than in the Gordo aquifer at any location.

ADDITIONAL INFORMATION

The map showing the results of the November and December 1982 water-level measurements for the Gordo aquifer is the second map showing ground-water levels in the aquifer. These maps are part of a series of maps that show water levels in the major aquifers in Mississippi. Data describing the individual wells used in this study may be obtained from the following:

Charles Branch, Director
Mississippi Department of Natural Resources
Bureau of Land and Water Resources
Post Office Box 10631
Jackson, Mississippi 39209
(601) 961-5200

Garald G. Parker, Jr.
District Chief
U.S. Geological Survey
Water Resources Division
Suite 710, Federal Building
100 W. Capitol Street
Jackson, Mississippi 39269
(601) 960-4600

Copies of this report can be purchased from:

Open-File Services Section
Western Distribution Branch
U.S. Geological Survey
Box 25425, Federal Center
Denver, Colorado 80225
(303) 234-5888

SELECTED REFERENCES

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

_____,1979, The Tuscaloosa aquifer system in Mississippi: U.S. Geological Survey Water-Resources Investigations Report 78-98, map.

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

Wasson, B. E., 1980, Potentiometric map of the Gordo aquifer in northeastern Mississippi, September, October, and November 1978: U.S. Geological Survey Water-Resources Investigations Open-File Report 79-1586, map.

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.

EXPLANATION

AREA OF OUTCROP OF GORDO FORMATION (GORDO AQUIFER)

--- 200 — 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.

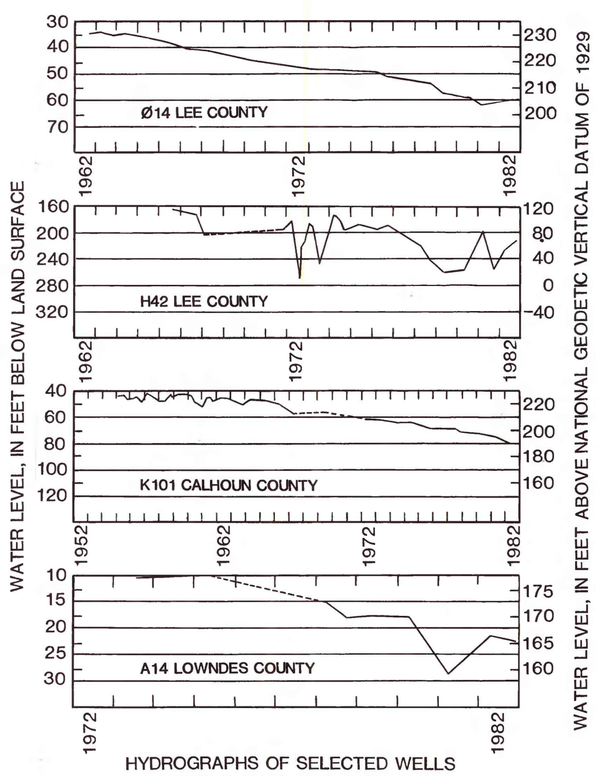
○ D18 OBSERVATION WELL AND NUMBER--Wells are numbered alpha-numerically by county.

● H42 OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN.

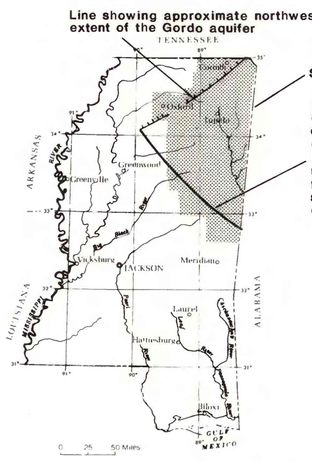
▲ POINT AT WHICH ALTITUDE OF WATER SURFACE IN STREAM WAS USED TO DEFINE THE POTENTIOMETRIC SURFACE OF AQUIFER.

To convert inch-pound units to metric units:

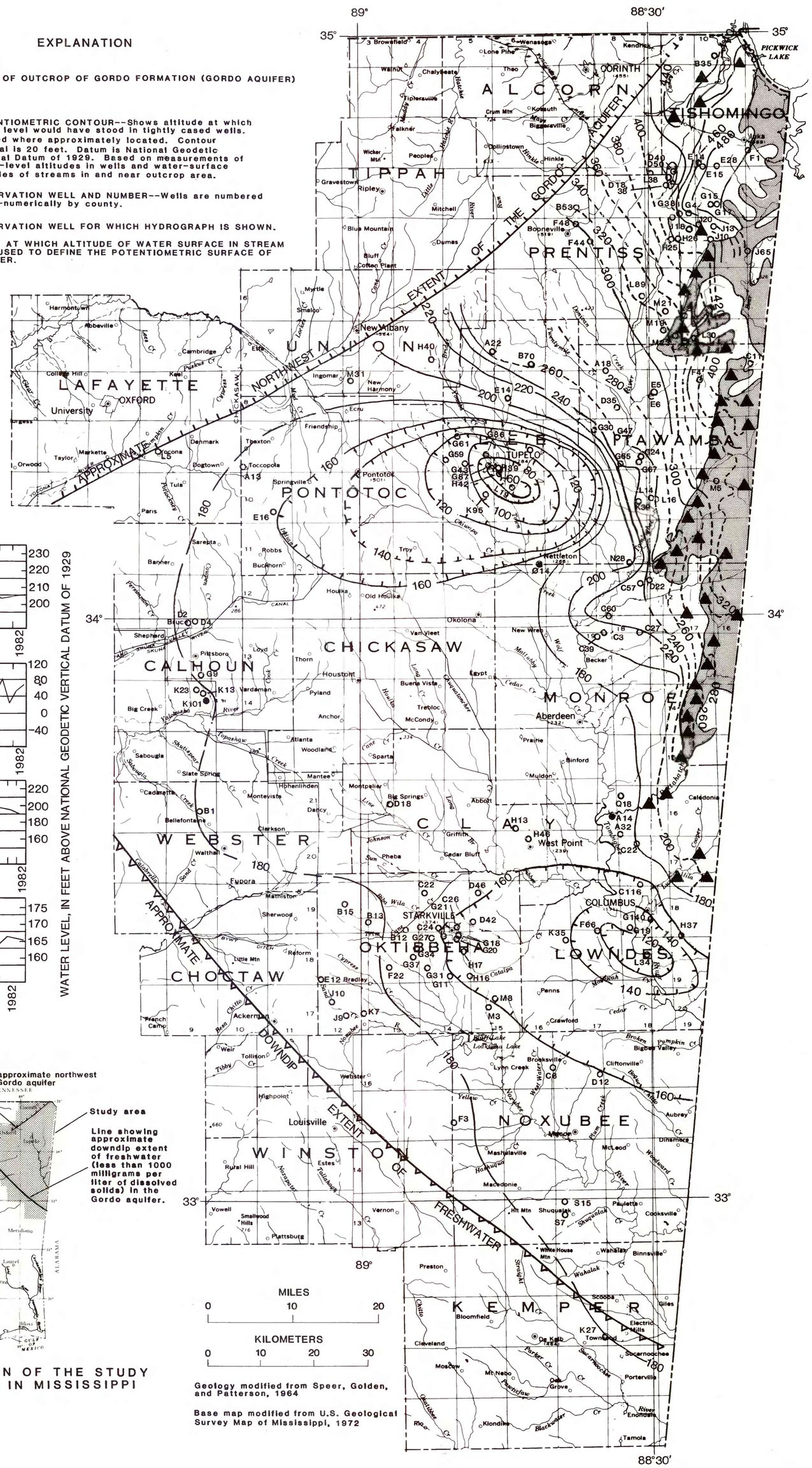
Multiply	by	To obtain
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)



HYDROGRAPHS OF SELECTED WELLS IN THE GORDO 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

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1984

JACKSON, MISSISSIPPI