DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
BUREAU OF LAND AND WATER RESOURCES

WATER-RESOURCES INVESTIGATIONS REPORT 86-4042

EXPLANATION

AREA OF OUTCROP OF COCKFIELD FORMATION--Generalized after Spiers (1977) from Belt and others(1945).

AREA OF SUBCROP OF COCKFIELD FORMATION BENEATH THE MISSISSIPPI RIVER VALLEY ALLUVIUM--Generalized after Spiers(1977).

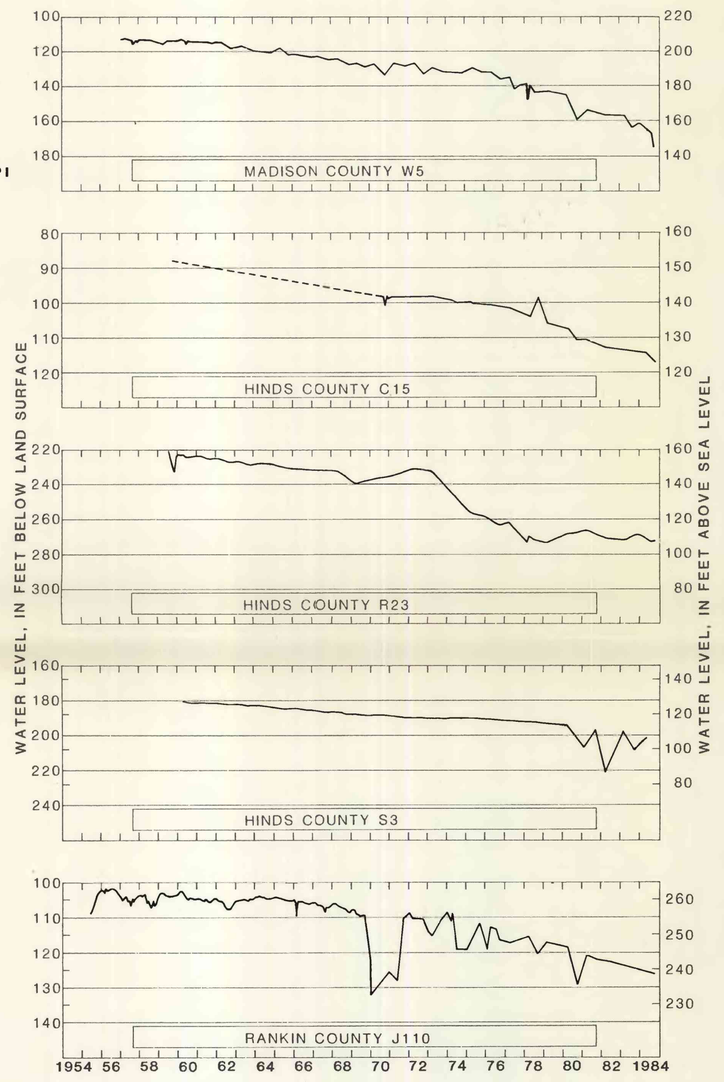
—240— POTENTIOMETRIC CONTOUR--Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Contour interval is 20 feet. Datum is National Geodetic Vertical Datum of 1929. Based on measurements of water-level altitudes in wells and on water-surface altitudes of streams in and near outcrop area.

W13 126 ○ OBSERVATION WELL--Upper number is well number which is alpha-numerical by county. Lower number is altitude

C15 123 ● OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN

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

EAST EDGE OF MISSISSIPPI RIVER ALLUVIAL PLAIN--That part of the plain north of Vicksburg known as the Yazoo basin and locally as "the Delta".



HYDROGRAPHS OF SELECTED WELLS IN THE COCKFIELD AQUIFER

LOCATION OF STUDY AREA IN MISSISSIPPI

POTENTIOMETRIC MAP OF THE COCKFIELD AQUIFER IN MISSISSIPPI, FALL 1984

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 Cockfield aquifer, follows a map that delineated the 1980 potentiometric surface of the aquifer (Wasson, 1981). This water-level map is based on water-level measurements made in about 80 wells in the Cockfield aquifer in the fall of 1984. The contours show altitudes at which water levels would have stood in tightly cased unpumped wells in fall 1984.

The Cockfield aquifer is composed of water-bearing sand beds in the Cockfield Formation of Eocene age. The Cockfield Formation ranges in thickness from a featheredge in the outcrop area in central Mississippi to about 600 feet in Warren and Washington Counties. Water-bearing sand makes up about 50 percent of the total thickness of the formation, which dips about 20 to 50 feet per mile to the southwest. In the southern part of the study area, the aquifer is confined by clay of the underlying Cook Mountain Formation; north of Yazoo County, however, the clay becomes sandy and less confining. South of the outcrop area (see map) the Cockfield aquifer is confined by the overlying Yazoo Clay of the Jackson Group. In the alluvial plain in northwestern Mississippi, the aquifer is hydraulically connected with the overlying Mississippi River alluvial aquifer except in areas where the Yazoo Clay is present. The Cockfield aquifer is not directly connected hydraulically with the Mississippi River. The aquifer is exposed at the surface about 30 miles southwest of the outcrop as an inlier on the Jackson Dome.

Precipitation recharges the Cockfield aquifer in the outcrop area from Clarke County to Holmes County and in the small inlier area along the Pearl River at Jackson. The regional ground-water movement -- southwestward from the outcrop area -- has been modified by large centers of pumping in Greenville and Jackson. As water moves downdip from the outcrop, mineralization increases. The approximate downdip extent of freshwater in the Cockfield aquifer (see map), is about 50 to 70 miles southwest of the outcrop area.

The Cockfield aquifer contains freshwater (less than 1,000 milligrams per liter of dissolved solids) in all or parts of 27 counties in Mississippi. The aquifer is the source of ground water for many large industrial and municipal wells and small domestic and stock wells.

In and near the outcrop area, water levels in the Cockfield aquifer have been stable since 1980. In the west where the aquifer is confined, water levels have declined about one-half foot per year. The largest declines, about 2 feet per year since 1980, have occurred in the Jackson area (see hydrographs), whereas water levels in the Greenville area have recovered about 2 feet per year since 1980. Where the Cockfield Formation is directly overlain by the Mississippi River Valley alluvium, water levels in both aquifers are at about the same altitude.

Base map modified from U.S. Geological Survey State base map, 1972

0 10 20 30 MILES
0 10 20 30 KILOMETERS

ADDITIONAL INFORMATION

The map showing the results of the fall 1984 water-level measurements for the Cockfield 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:

Director
Mississippi Department of Natural Resources
Bureau of Land and Water Resources
P.O. Box 10631
Jackson, Mississippi 39209
(601) 961-5200

District Chief
U.S. Geological Survey
Water Resources Division
100 West Capitol Street
Federal Building, Suite 710
Jackson, Mississippi 39269
(601) 965-4600

Copies of this report can be purchased from:

Open-File Services Section
Western Distribution Branch
Box 25425, Federal Center
Lakewood, Colorado 80225
(303) 234-7476

SELECTED REFERENCES

Belt, W. E., and others, 1945, Geologic map of Mississippi: Mississippi Geological Society, 1 sheet.

Harvey, E. J., Callahan, J. A., and Wasson, B. E., 1964, Ground-water resources of Hinds, Madison, and Rankin Counties, Mississippi: Mississippi Board of Water Commissioners Bulletin 64-1, 38 p.

Spiers, C. A., 1977, The Cockfield aquifer in Mississippi: U.S. Geological Survey Water-Resources Investigations Report 77-17, 1 sheet.

Spiers, C. A., and Dalsin, G. J., 1979, Water for municipal and industrial development in Hinds, Madison, and Rankin Counties, Mississippi: Mississippi Research and Development Center Bulletin, 78 p.

Wasson, B. E., 1981, Potentiometric map of the Cockfield aquifer in Mississippi, fall 1980: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-1053, 1 sheet.

POTENTIOMETRIC MAP OF THE COCKFIELD AQUIFER IN MISSISSIPPI, FALL 1984

By
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JACKSON, MISSISSIPPI