

PROPERTY OF MICHAEL T. SLACK

**CHARACTERIZATION OF AQUIFERS DESIGNATED
AS POTENTIAL DRINKING-WATER SOURCES
IN MISSISSIPPI**

**U. S. GEOLOGICAL SURVEY
WATER RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 81-550**

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**MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
BUREAU OF POLLUTION CONTROL**



Agricultural chemicals used in the heavily farmed area may be a source of contamination of the aquifer in some places.

Gravel is mined from the Mississippi River valley alluvial aquifer and from other alluvium in the state. Mining of gravel and possible future mining of lignite locally may cause changes in recharge to the aquifer and quality of water in the aquifer.

* Citronelle Aquifers

The Citronelle aquifers are made up of many discontinuous, hydrologically independent aquifers. They are present in the state from around 32° latitude southward (fig. 8). The beds are exposed at the surface over most of their area of occurrence and are present primarily on hilltops. Along stream valleys they have been eroded to expose the underlying Miocene beds. The aquifers dip southward at about 6 ft/mi and the dip becomes steeper near the coast where they are overlain by coastal terraces. The aquifer is thickest and less dissected near the coast but rarely exceeds 100 feet thick. The Citronelle is made up of quartz sand, chert gravel, and lenses and layers of clay. It is a major source of gravel in the state.

The Citronelle Formation commonly is only partially saturated. It is a water table aquifer with water levels which vary from place to place due to the discontinuous nature of the aquifer. The low water levels vary seasonally, but are little affected regionally by pumpage because very little water is withdrawn. Locally however, water levels are lowered rapidly by pumpage. Recharge is from rainfall directly on the outcrop, and water moves quickly both vertically and downdip, recharging the underlying Miocene aquifers and sustaining local streams.

Six aquifer tests indicate transmissivities ranging from 4,000 to 13,000 ft²/d, hydraulic conductivities of 82 to 200 ft/d, and specific capacities of 6.2 to 46 (gal/min)/ft of drawdown (Boswell, 1979a). The limited saturated thickness and limited storage capacity of the Citronelle limits its use. Large wells can be developed in the Citronelle, but a larger and more reliable source is available from the underlying Miocene aquifers.

Dissolved-solids concentrations of water in the Citronelle are less than 500 mg/L except at places along the coast where seawater is in contact with the aquifer. At most localities the water is high in iron content. In addition to local contamination by seawater along the Gulf Coast, the Citronelle may be contaminated by landfills in old gravel pits, by sewage, and by industrial and oil field wastes in surface pits. Most of the wastes in the area are dispersed through area streams, but some move into the underlying Miocene aquifer system.

* Miocene Aquifer System

The Miocene aquifer system crops out in most of the southern one-third of the state (fig. 9) except where it is covered by younger coastal deposits and the Citronelle Formation. The aquifer system is composed of numerous interbedded layers of sand and clay that include

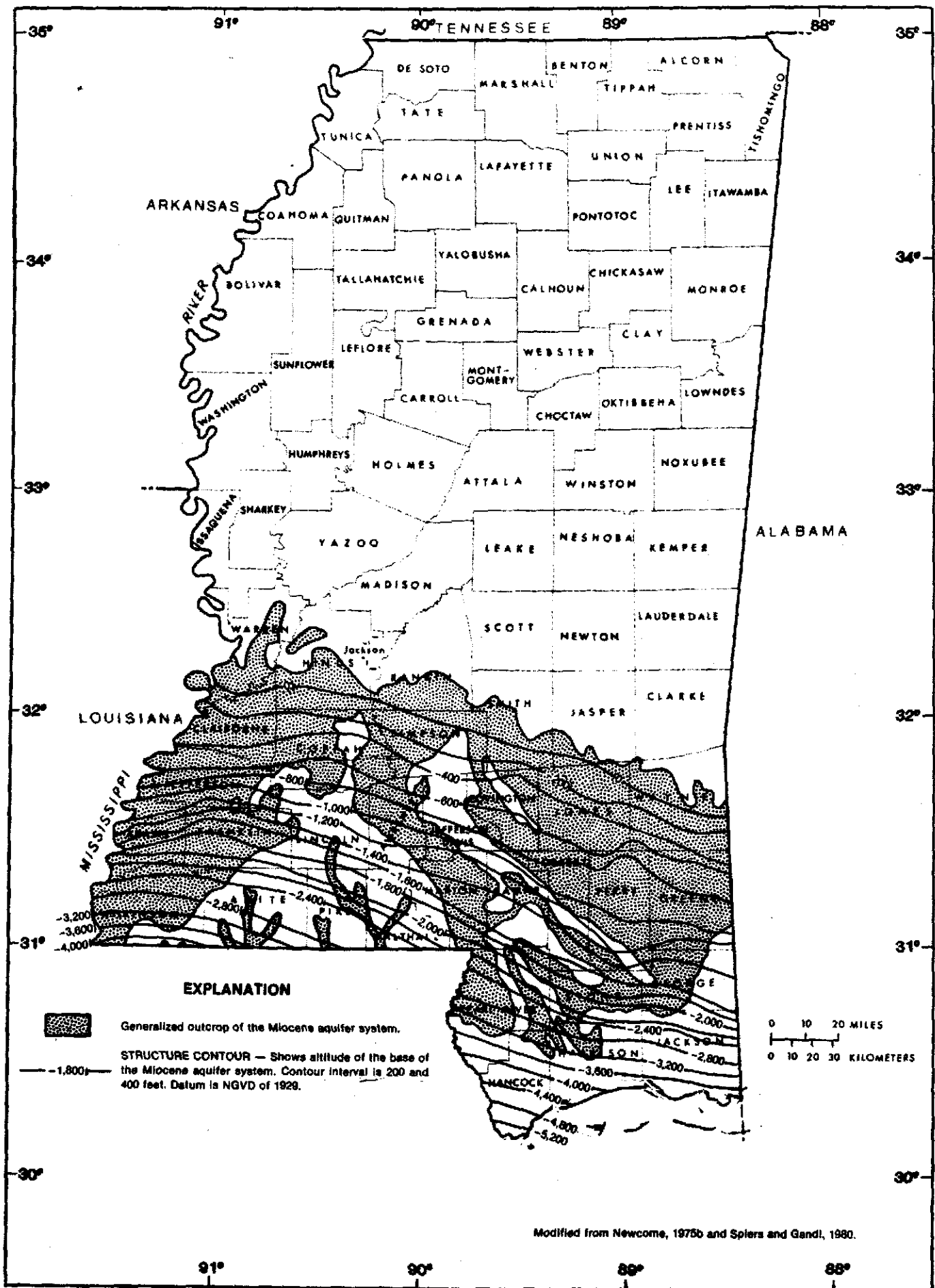


Figure 9. — Configuration of the base of the Miocene aquifer system.

the Pascagoula and Hattiesburg Formations, and the Catahoula Sandstone. Because of their interbedded nature, the formations cannot be reliably separated and correlated either on the surface or in the subsurface. The formations dip southwestward at 30 to 100 ft/mi and the dip steepens towards the coast. The aquifer system thickens as the dip steepens (fig. 10), and the thickness exceeds 3,000 feet near the coast. Within that 3,000 feet, the sand beds alone are over 1,000 feet thick, although the deepest beds do not contain freshwater (fig. 11).

The shallowest sands of the Miocene aquifer system are water-table aquifers, but the deeper sands are confined and are fully saturated. Water levels in the Miocene aquifers vary, but usually range from a few feet above land surface to 100 feet below land surface. Water levels have been regionally declining by 1 to 2 ft/yr, although the decline is greater near some centers of pumpage.

Recharge to the Miocene aquifers is from rainfall directly on the outcrop, seepage from the overlying Citronelle Formation, and leakage between aquifer units of the Miocene aquifer system.

Water movement is downdip, towards center of pumpage, and between aquifers of the system. The underlying Oligocene formations and in particular the clay of the Bucatunna Formation prevents movement between the Miocene and Oligocene aquifer systems.

The Miocene aquifers are a very prolific source of ground water. Aquifer test results have indicated transmissivity values averaging 13,000 ft²/d. Hydraulic conductivities determined from the tests average 95 ft/d, and specific capacities are as high as 30 (gal/min)/ft of drawdown (Newcome, 1975b).

Wells in the Miocene usually tap only the upper aquifers because abundant water is available at shallow depths. Much freshwater in the deeper aquifers is available but undeveloped. The aquifers are utilized for small domestic wells and large municipal and industrial wells.

Water in the Miocene aquifers commonly is a soft sodium-bicarbonate type. Excessive iron is found in samples from some locations, but this is at places due to corrosion of pipes. Downdip near the coast, water in the deeper sand beds is saline (fig. 11). However, freshwater may be available on the offshore islands at estimated depths as great as 2,200 feet below sea level in some places.

The shallow Miocene aquifers have been contaminated in places by improperly sealed surface disposal sites and by leakage from disposal sites in the overlying Citronelle Formation (Boswell, 1979a). The deepest Miocene aquifer, the Catahoula Sandstone, is used for brine disposal in Adams, Wilkinson, and Hancock Counties (Bicker, 1972).

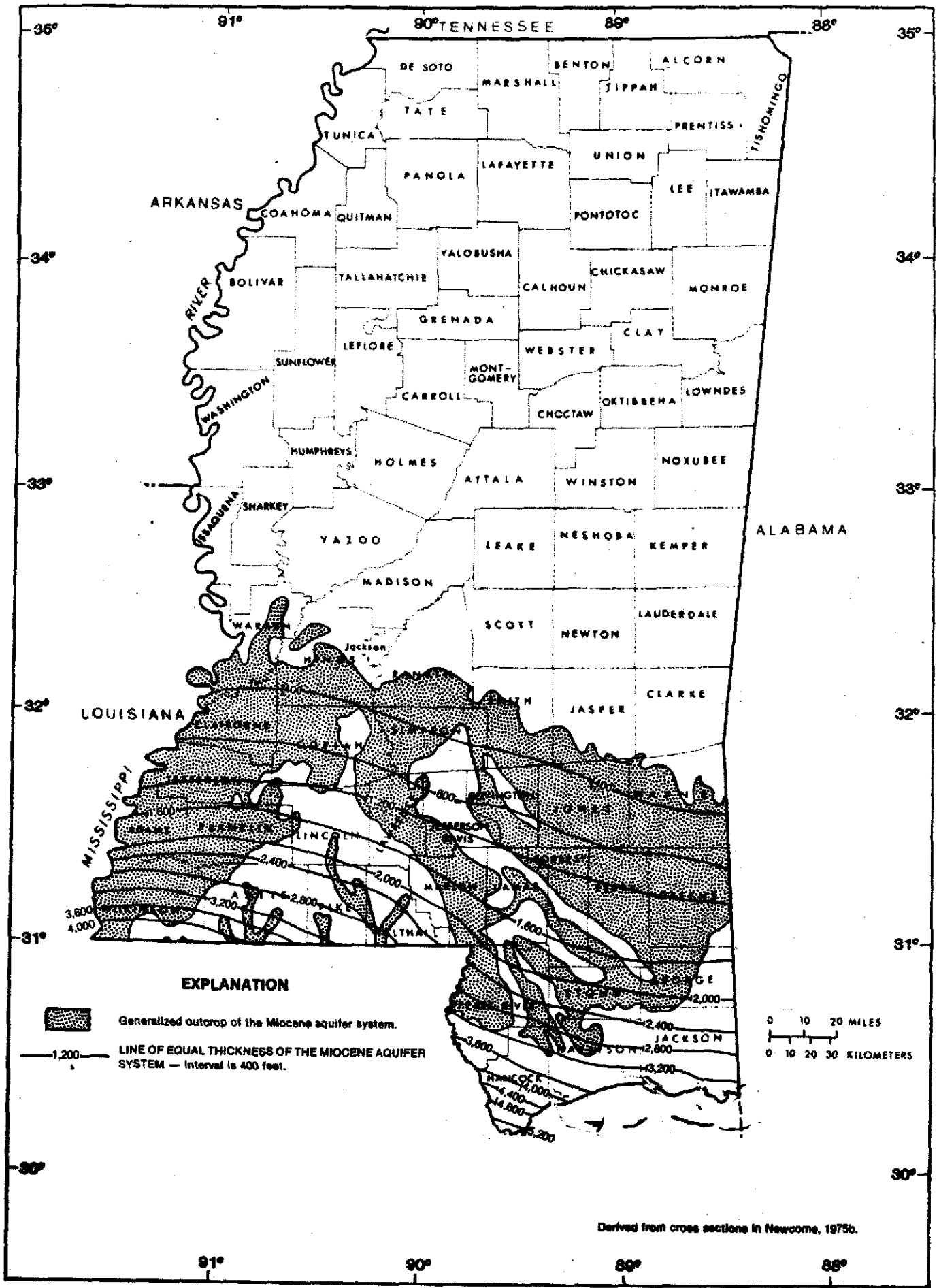


Figure 10. — Thickness of the Miocene aquifer system.

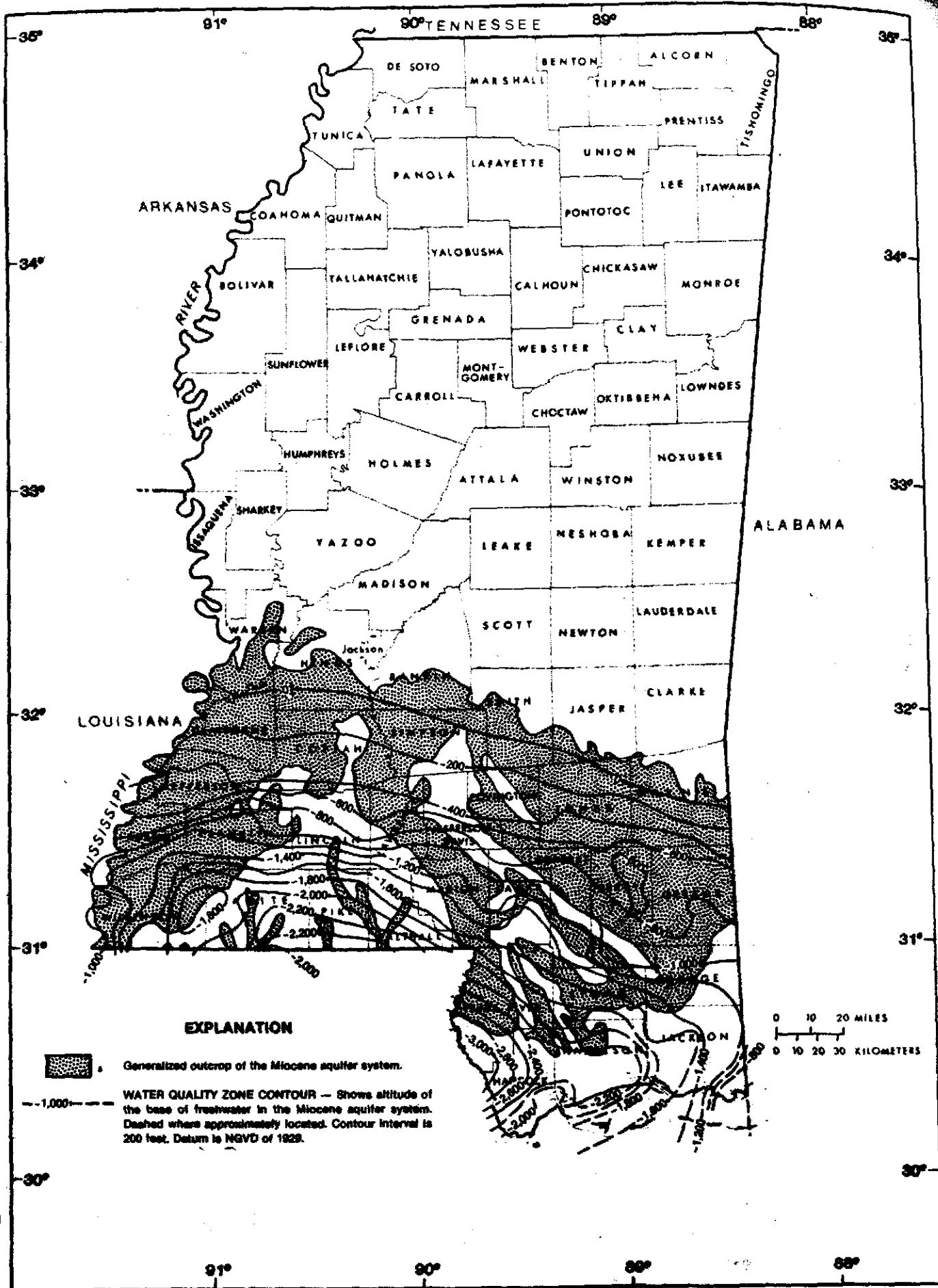


Figure 11. — Configuration of the base of freshwater in the Miocene aquifer system.