

EXPLANATION

- Outcrop area of the St. Francois aquifer
- Outcrop area of rocks comprising geohydrologic unit older than the St. Francois aquifer
- Area where the St. Francois aquifer and stratigraphically equivalent units are missing in the subsurface
- Contact
- Approximate boundary of Ozark Plateaus aquifer system
- Line of equal thickness of St. Francois Aquifer¹—Lines in areas of few control points are consistent with thickness data calculated from digital representations of altitude of top of the St. Francois aquifer and altitude of top of underlying basement confining unit. Interval, in feet, is variable
- Control data point²—Part of Central Midwest Regional Aquifer-System Analysis data base. Number is thickness, in feet, of St. Francois aquifer (> means greater than)
- Auxiliary control data point³—Lines and control points beyond the approximate boundary of the Ozark Plateaus aquifer system are for units stratigraphically equivalent to those that comprise the Ozark Plateaus aquifer system

THICKNESS

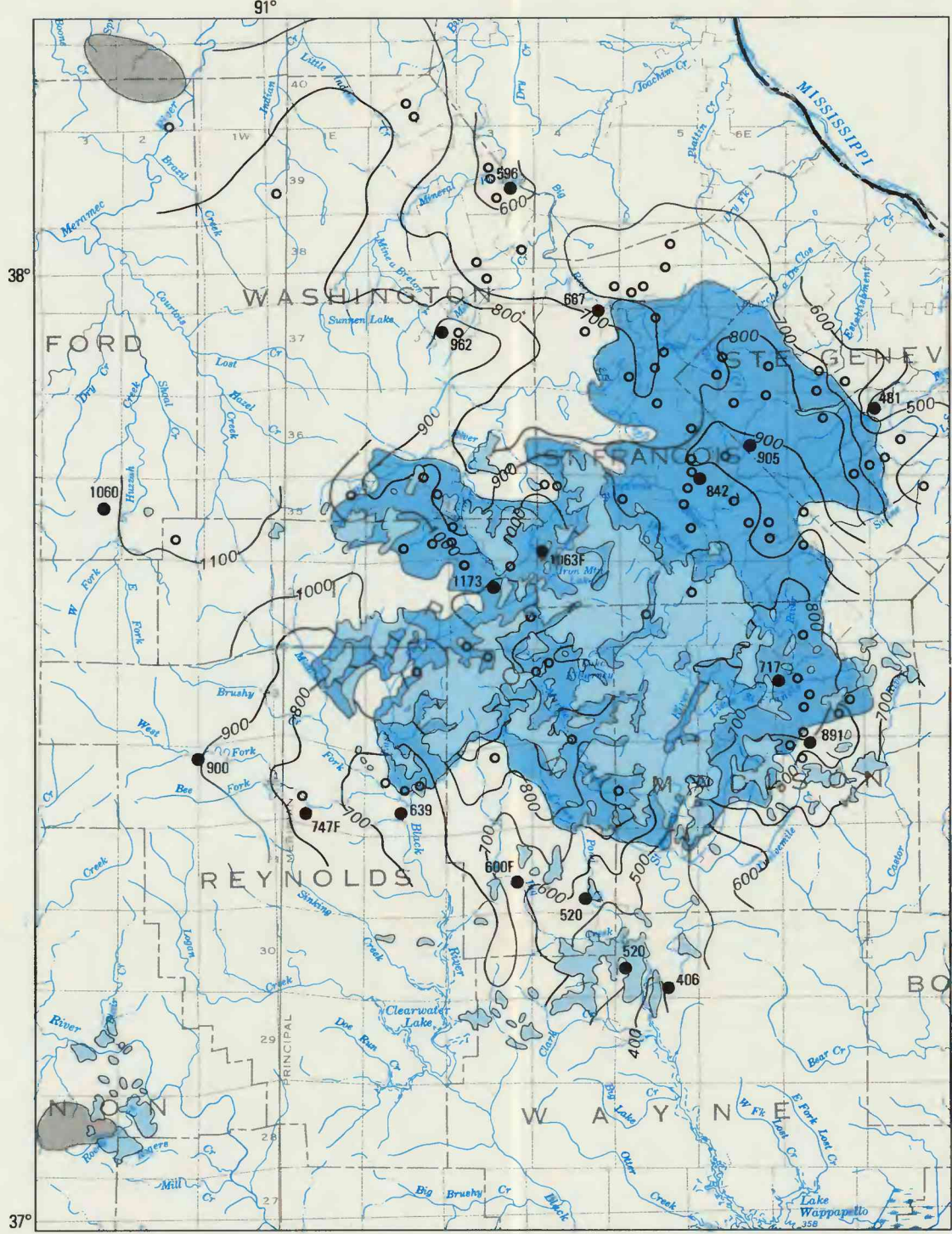
The St. Francois aquifer is thickest (greater than 1,000 feet) in the eastern part of the Ozark Plateaus province near the Mississippi Alluvial Plain (index map). The aquifer generally is between 300 and 500 feet thick immediately west and southwest of the St. Francois Mountains and less than 300 feet thick in the western, southwestern, and southern parts of the province. Well logs show that the aquifer is breached by Precambrian rocks primarily in southeastern Missouri and northeastern Oklahoma. Depositional characteristics of the sediments forming the aquifer in the vicinity of the St. Francois Mountains indicate the beds in the Precambrian topography were once islands in the Late Cambrian seas and received few, if any, deposits of sediments that comprise the St. Francois aquifer. The sediments that form the St. Francois aquifer are conformable with less permeable sediments of the overlying Davis Formation. The irregular thickness of the St. Francois aquifer appears to reflect the rugged topography of the Precambrian surface.

GEOHYDROLOGIC PROPERTIES

Lamotte Sandstone and Bonnetter Dolomite form the St. Francois aquifer in the eastern two-thirds of the province. The Lamotte generally is a well-sorted sandstone with some silt, locally grading into arkose and conglomerate. The overlying Bonnetter Dolomite is predominantly a coarse-grained dolomite, containing numerous small cavities, resting on a sandy dolomite base. Generally, both the Lamotte and Bonnetter are relatively permeable and yield adequate supplies of water for domestic and small public supply where penetrated by wells. Estimates of hydraulic conductivity in the immediate vicinity of the St. Francois Mountains, using specific capacity data, range from 1-15 feet per second to 1-10 feet per second and tend to decrease away from the mountains. The western one-third of the aquifer is composed of Reagan Sandstone, a near-shore facies of the Lamotte Sandstone, Bonnetter Dolomite, and Davis Formation (Kurtz and others, 1975). The Reagan generally is a poorly sorted sandstone containing small quantities of silt and shale. Little is known of geohydrologic properties of the Reagan because few water wells are drilled deep enough to penetrate the formation. Information from a well drilled at southwestern Jasper County, indicates that the Reagan Sandstone is hydrologically similar to the moderately permeable Lamotte Sandstone.

The St. Francois aquifer is used as a source of water primarily at its outcrop area in the St. Francois Mountains. Water quality in this region is adequate for most uses, and dissolved-solids concentrations range from about 220 to 450 milligrams per liter. Yields from wells that are open only to the Bonnetter Dolomite are somewhat less than those from wells also open to the Lamotte Sandstone. Wells that penetrate only the Bonnetter in the outcrop area typically produce less than 50 gal/min, and the production rate increases with well depth. Those wells that are open to a significant thickness of Lamotte Sandstone usually have yields ranging from 100 to 500 gal/min. Many 200- to 300-foot deep wells that are open only to the Bonnetter have small yields (between 1 and 10 gal/min). This indicates that in some areas the Bonnetter is tightly cemented and does not contain a well-developed solution-channel system. Depth to water in the outcrop area ranges from ground level to about 150 feet.

In the vicinity of the St. Francois aquifer outcrop area, ground-water levels are controlled by topography. Ground-water discharge occurs along the St. Francis and Black Rivers to the south and the Big River to the north. Beyond the outcrop area the aquifer is confined and is seldom used as a sole source of water, because the overlying Ozark aquifer usually produces adequate water supplies. The few wells in south-central and southeastern Missouri that do penetrate the St. Francois aquifer also are open to the overlying aquifer. Thus, little is known about the relative altitude of the potentiometric surface of the St. Francois aquifer to that of other aquifers. Generally, well yields are not increased significantly by increasing well depths to include the St. Francois aquifer. Wells drilled in Jasper and Pettis Counties, Missouri, show that the limit of freshwater in the St. Francois aquifer is to the west of these counties.



PREDEVELOPMENT POTENTIOMETRIC SURFACE NEAR THE ST. FRANCOIS MOUNTAINS

EXPLANATION

- Potentiometric Contour—Shows altitude at which water levels stood in tightly cased wells open to the St. Francois aquifer. Contours in outcrop area are drawn consistent with surface topography. Contour interval, in feet, is variable
- National geodetic vertical datum of 1929
- Control data point²—Part of Central Midwest Regional Aquifer-System Analysis data base. Number is altitude, in feet, of water level (F means flowing well). National geodetic vertical datum of 1929

Other map symbols and map scale are identical to those of the adjacent map

Base from U.S. Geological Survey
Data from maps: 1:50,000, Arkansas, 1967;
Kansas, 1953; Missouri, 1975; Oklahoma, 1972

Thickness of St. Francois Aquifer

MAJOR GEOHYDROLOGIC UNITS IN AND ADJACENT TO THE OZARK PLATEAUS PROVINCE, MISSOURI, ARKANSAS, KANSAS, AND OKLAHOMA—ST. FRANCOIS AQUIFER

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