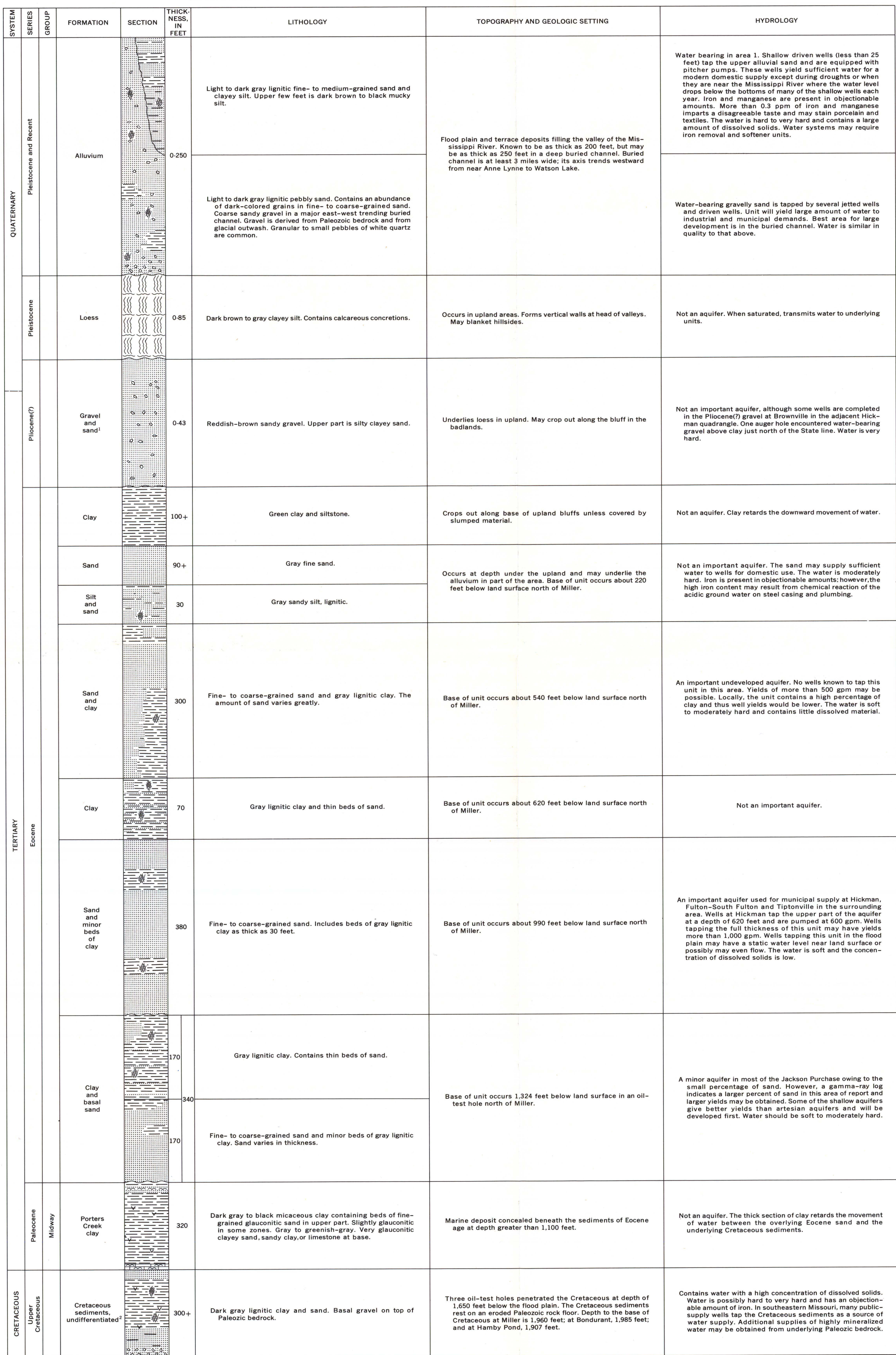
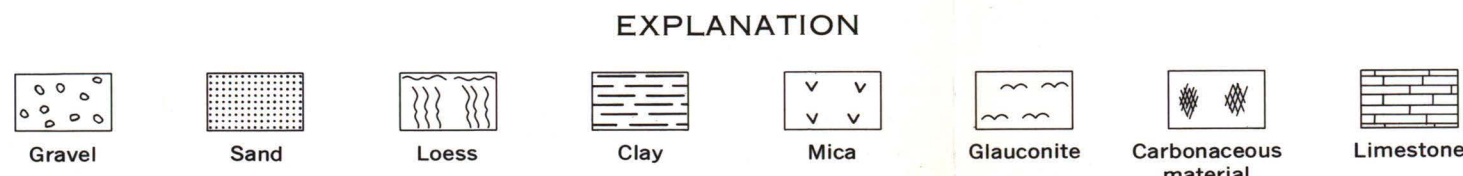


GENERALIZED COLUMNAR SECTION AND WATER-BEARING CHARACTER OF GEOLOGIC FORMATIONS



¹Age undetermined. Estimates of age range from Pliocene to older to Pleistocene.
²May contain beds of Clayton age at the top.



AVAILABILITY OF GROUND WATER IN PARTS OF THE NEW MADRID SE HUBBARD LAKE, AND BONDURANT QUADRANGLES, JACKSON PURCHASE REGION, KENTUCKY-TENNESSEE

An abundance of ground water for domestic, irrigation, and industrial supplies is available in the southwestern part of Fulton County, Kentucky. This valuable resource has not been exploited and will furnish sufficient amounts of water for future industrial developments and public demands.

The most important aquifers (geologic formations that yield water) are the alluvial deposits and the sands of the Eocene formations. Less important aquifers are the deeper Cretaceous sediments and the Paleozoic limestones and dolomites. An auger hole in the upland also found

water-bearing Pliocene(?) gravel above Eocene clay. Several wells in the upland in the adjacent Hickman quadrangle tap Pliocene(?) gravel and furnish sufficient water for domestic use.

The depth to the main zone of saturation in the Quaternary alluvium ranges from a few feet below land surface near the valley wall in the southeastern corner of Bondurant quadrangle to more than 25 feet below land surface near the Mississippi River. The maximum thickness of the alluvium may be 250 feet. The saturated thickness ranges from about 80 to more than 200 feet. Most driven wells tap an upper sand, while jetted wells tap the underlying pebbly sand. Normally throughout the year, the ground water flows from the valley wall toward the river. At high river stage the flow of ground water near the river is reversed and wells near the levee may flow.

Very little water is withdrawn from the alluvium in this area. Probably more than three-fourths of the wells are equipped with pitcher pumps. The most productive wells yield about 5 gallons per minute, but large yields for industrial demands can be obtained from wells designed and constructed to pump a greater quantity of water.

Because an abundant quantity of ground water is available from the alluvium, the sands of the Eocene formations and the badlands have not been tapped for water supply. Only one well in the area is known to tap an upper Eocene sand and this well is in the upland in the southeastern corner of the Bondurant quadrangle. Three important Eocene aquifers are available for development by industry. In an oil-test hole north of Miller, these aquifers are at depths of 200-540 feet, 610-990 feet, and 1,200-1,320 feet.

Wells tapping the deeper sand in the Eocene underlying the flood plain may have a sufficient head to flow at the land surface.

The shallowest water-bearing unit that will yield a dependable supply of ground water is shown on the water-availability map. For example, the color pattern for area 1 at Miller in the southwestern corner of the Bondurant quadrangle indicates that the shallowest source of a dependable supply is the main zone of saturation in the alluvium, the upper surface of which occurs a few feet below land surface. Well data indicate the depth of wells and the depth to water in the alluvium; chemical analyses indicate the chemical composition of the water. The explanation indicates other aquifers that may be tapped and geologic cross sections show the occurrence of the various geologic units beneath the surface. The quality of the water from the alluvium in

the main zone of saturation is considered to be good for most uses although some objectionable constituents are present. The concentration of dissolved solids ranges between 250 to 550 ppm (parts per million) and the water is hard to very hard. Iron and manganese are present in objectionable amounts and may impart a disagreeable taste to the water. More than 0.3 ppm of iron and manganese may cause staining of porcelain and textiles. The high iron content of the water from the alluvium may limit the use of the water unless it is treated for removal. Owing to the shallowness of the water table, shallow wells are susceptible to pollution, which is suggested by nitrate concentrations that are appreciably higher than the average for the Jackson Purchase region. The temperature of the water ranges from 58° to 62°F throughout the year and makes it useful as a coolant.

The quality of the water from the Eocene is excellent for many uses. The concentration of dissolved solids is less than 150 ppm and decreases with depth. Water from the municipal wells at Hickman, about 4 miles east of this area, contains about 70 ppm of dissolved solids. The water is slightly acidic and is somewhat corrosive. Water from shallow drilled wells may contain objectionable amounts of iron which is probably the result of a chemical reaction of acidic ground water on steel well casing and pump equipment. Large concentrations of iron are rarely present in water from shallow wells that have plastic casing and plastic plumbing. Water from deep wells may also contain objectionable amounts of iron. The temperature of the water ranges from 58° to 64°F.

The following table shows the iron and manganese content, in parts per million, and the hydro-

gen-ion concentration, expressed as pH, of the water analyses shown by circular diagrams on the maps. A pH of 7.0 indicates neutrality of a solution. Values higher than 7.0 denote increasing alkalinity, values lower than 7.0 indicate increasing acidity. Corrosiveness of water generally increases as pH decreases.

Analysis number	1	2	3	4	5	6	7	8	9	10
Iron content	18	4.6	17	6.1	6.3	0.67	12	0.42	4.3	8.8
Manganese content	—	—	—	0.29	—	6.3	0.19	—	—	—
pH	7.1	7.2	7.1	7.1	7.1	6.7	6.9	6.4	7.2	7.3

Analysis number	11	12	13	14
Iron content	9.6	0.40	14	5.6
Manganese content	—	2.7	—	0.41
pH	6.8	7.4	7.0	6.6

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New Madrid SE and western Hubbard Lake quadrangles

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