

Systematic Variability of Hydraulic Conductivity within the Mississippi River Alluvial Aquifer in Northeastern Louisiana

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ABSTRACT

The freshwater portion of the Mississippi River Alluvial Aquifer covers a large area of south-central and northeastern Louisiana. In northeastern Louisiana this aquifer is the principal source of groundwater. This area, which includes Avoyelles, Catahoula, Concordia, East Carroll, Franklin, Madison, Morehouse, Richland Tensas, and West Carroll parishes, is the focus of this study. The aquifer is approximately 100 to 150 ft thick, and composed of a mixture of sand, gravel and clay. Analysis of approximately 1,200 specific-yield tests reveals that hydraulic conductivity of this aquifer varies areally and lithologically.

The hydraulic conductivity (K) generally increases with depth, which is probably a result of sediment coarsening downward. For example, in Franklin Parish there are two different layers in terms of K. For approximately 120 observations with mean screen position between 55 ft and 70 ft the geometric mean of K equals 110 ft/day. By comparison, for approximately 145 observations with mean screen position between 75 ft and 100 ft the geometric mean of K equals 165 ft/day. The K generally increases with increased grain size as described on drillers' logs. For 44 observations screened across fine sand and silt the geometric mean of K equals 5.4 ft/day. By comparison for 432 observations screened across coarse sand and gravel the geometric mean of K equals 132 ft/day. The geometric mean value of K generally decreases southward as the sediment becomes generally finer. For the approximately 230 observations in the northernmost three parishes the geometric mean of K equals 210 ft/day. By comparison for the approximately 250 observations in the southernmost three parishes the geometric mean of K equals 80 ft/day.