
Influence of Lithology on Scaling Factors for Permeability of Louisiana Geologic Units

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ABSTRACT

During the past 30 years previous workers have recognized that the value of permeability is a function of sample-size volume (scale). However, few if any Louisiana studies have to date considered scaling factors. In general, as sample size increases, permeability value increases. Knowledge of scaling factors allows laboratory measurements to be easily converted into approximate field values, which can facilitate various planning and modeling studies. This initial study of Louisiana stratigraphic units considers the dependence of permeability on sample size (scale).

Scaling factors for formations from Jurassic Smackover carbonates up to Pliocene sandstones were determined from a comparison of permeability results for each unit: permeameter tests (laboratory scale) to well tests (field scale). Permeability test results were collected from Louisiana Geological Survey's log library. These results were compared with well test results included in the Louisiana Department of Natural Resources SONRIS (Strategic Online Natural Resource Information System) well reports.

Analysis by stratigraphic unit reveals the influence of scaling on permeability. The geometric mean of scaling factor for carbonate units (Navarro, Monroe Gas Rock, Austin, Rodessa, Pearsall, Sligo-Hosston, and Smackover) is 741, and the geometric mean of scaling factor for siliciclastic units (Upper Miocene, Middle Miocene, Lower Miocene, Anahauc, Frio, Cockfield, Sparta, Wilcox, Tuscaloosa, and Cotton Valley) is 114. The difference between carbonates and siliciclastics is consistent with studies conducted in Illinois, Minnesota, Wisconsin, and the Bahamas.