

Origin and Distribution of Friable and Cemented Sandstones in Outcrops of the Pennsylvanian Jackfork Group, Southeast Oklahoma

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This paper presents the results of an outcrop study of the Pennsylvanian Jackfork Group in which the ultimate goal was to make connections between depositional and post-depositional geologic processes, their lithologic characteristics, sequences and reservoir quality characteristics. The importance of understanding these geologic controls on porosity and permeability is very critical for understanding and predicting the production performance of Jackfork reservoirs.

In certain outcrops in eastern Oklahoma, sandstones are predominantly quartz-cemented, sub-arkoses, which are sometimes fractured. However, extremely friable sandstones also occur stratigraphically adjacent to the quartz-cemented sandstones. The different sandstones are representative of differing porosity and submarine fan facies types. Four stratigraphic sections have been measured with corresponding outcrop gamma logs. The stratigraphy consists of possible third and fourth order depositional sequences and systems tract deposits, which aid in characterizing the distribution of facies in the sections.

Lithologically, the quartz-cemented sandstones are very fine to fine grained, moderately to well-sorted and planar-tabular bedded with characteristic deepwater sedimentary structures. By contrast, the friable sandstones are medium to fine grained, predominantly, poorly to moderately sorted, massive and amalgamated, frequently with undulatory bed boundaries. Petrographic and other studies of the sandstones show different diagenetic features of quartz overgrowth and pressure solution in the quartz-cemented sandstones and feldspar dissolution and clay content in the friable sandstones.

Though distinguishable in outcrop, results from the outcrop gamma log show that it is difficult to impossible to distinguish the zones containing matrix porosity from those containing fracture porosity on the basis of subsurface gamma ray logs.