

Petrographic Facies of the Albian Siliciclastics from Northeastern Saudi Arabia

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ABSTRACT

The Albian clastic section of NE Saudi Arabia, known as the Khafji and Safaniya members of the Wasia Formation, is an important oil reservoir and minor source rock. The aim of the study was to characterize the lithofacies and define the clay composition, quantity and its impacts on reservoir quality. Petrographic analyses of 106 thin sections were conducted in a c.700 ft. thick section. Two common lithologies dominate the sample, namely: the argillaceous sandstones that are commonly intercalated with argillaceous siltstone and the argillaceous sandstone that is generally very fine grained to lower medium grain size with abundant argillized rock fragments and detrital clay matrix. Less common facies are siderite-rich sandstone and limestones. Common detrital grains are monocrystalline quartz, plagioclases, few K-feldspars, lithic fragments, muscovite mica and organic matter. Authigenic minerals include siderite, ferroan dolomite, calcite, kaolinite, chlorite, illite, pyrite and quartz. Reservoir quality is mostly controlled by the amount and distribution of detrital clay and with the changes in lithofacies. Abundant primary intergranular pores are confined mostly to the intervals of clean sandstone and in slightly argillaceous sandstones. A reservoir quality is locally affected by siderite or carbonates cement, quartz overgrowths and pressure solution of grains due to compaction.