

Low Permeability Triassic Gondwana Reservoirs of Mandapeta Graben, Krishna-Godavari Basin, India

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The Mandapeta graben of Krishna-Godavari basin is the only proven Gondwana petroleum system in India. Commercial production of hydrocarbons is obtained from the Middle to Late Triassic Mandapeta Sandstone. This paper attempts to analyze the geological characterization of this sandstone and correlate it with its production patterns.

The Mandapeta Sandstone consists of fine to coarse-grained, pebbly, poorly sorted, massive sandstone with occasional clasts of claystone and rock fragments. The sedimentary structures include graded bedding, cross bedding, flasers and syn sedimentary structures. Quartz wacke and quartz arenite are main rock types with quartz, subordinate feldspar, rock fragments and mica as detrital grains with chloritic and micaceous matrix. The cements include authigenic quartz, hematite, calcite, pyrite and clays. Secondary silica and calcite are the major cements. Intergranular porosity is poor to moderate while the permeability is very low. Poor porosity is mainly due to textural immaturity, poor sorting of the detrital grains and dominance of clay matrix. Pores are further reduced due to early and late diagenetic effects.

Compactional features like mica deformation, grain rearrangement and clay coating on grains represent early diagenetic stage. Silica, iron oxide, calcite and authigenic kaolinite have precipitated during this stage. Feldspar leaching was active in early stage due to meteoric water flooding. The late diagenetic stage exhibits the transformation of kaolinite and smectite to illite and chlorite in lower Mandapeta Sandstone. The combined effect of higher matrix content, clay coating, authigenic pore filling clay and pressure solution of grains has led to poor permeability and productivity.