Reservoir Characterization Of The Scollard-Age Fluvial Sandstones, Alberta Foredeep

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ABSTRACT

Detailed petrographic and laboratory studies of 53 sandstone samples from the Maastrichtian-Paleocene Scollard sequence in the Western Canada foredeep were undertaken to investigate the reservoir characteristic and to determine the effect of diagenesis on reservoir quality. The petrography of the Scollard sequence sandstones is defined by litharenites and sublitharenites, which accumulated in a variety of fluvial environments. Porosity of sandstones in this sequence is both depositional and diagenetic in origin. Laboratory analyses indicate that porosity in sandstones with less than 5% calcite cement averages 15%, with a mean permeability of 79 mD. In contrast, sandstones with greater than 5% calcite cement average 8% porosity, with a mean permeability of 1.3 mD. Cementation coupled with compaction had an important effect in the destruction of porosity of the sequence. The matrix porosity and permeability are also severely reduced where the pore-lining clays are abundant (>15%). The potential of a sandstone to serve as a reservoir for producible hydrocarbons is strongly related to its diagenetic history. Three diagenetic stages are identified which are eodiagenesis before effective burial, mesodiagenesis during burial, and telodiagenesis during exposure after burial. Eodiagenesis resulted in mechanical compaction, calcite cementation, kaolinite and smectite formation, and dissolution of chemically unstable grains, whereas mesodiagenesis resulted in chemical compaction, precipitation of calcite cement, quartz overgrowths, chlorite, dickite, and illite formation**.** Finally, telodiagenesis seemed to have less effect on reservoir properties, even though it resulted in the precipitation of some kaolinite and the dissolution of feldspar.