

Petroleum Geochemistry of the Lower Cretaceous Mannville and Jurassic Ellis Groups, Southern Alberta, Canada

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The variation of oil quality in southern Alberta, Western Canada Sedimentary Basin, Canada is primarily due to differences in oils generated from different source rocks and biodegradation of oils in reservoirs. 280 oil samples were collected and analysed by GC and GC-MS, in order to assess the nature and extent of these petroleum systems.

Oils from Lower Cretaceous Mannville and Jurassic Ellis Group reservoirs in southern Alberta, Canada (T1-40; R1-25W5) were generated from at least five different source rocks. The proven/probable source rocks include: the Devonian Duvernay Formation (Family D), the Devonian-Mississippian Exshaw Formation (Family E), a probable Paleozoic source (Family M), a probable Jurassic source (Rierdon/Fernie shales; Family F), and the Cretaceous Ostracod Zone (Family Q). Family D oils are restricted to the northernmost part of the study area (Provost field).

Biodegradation and the mixing of degraded with non-degraded oils are the main factors controlling the variation in oil quality within a given family. The much improved understanding of oil families and degree of biodegradation allow for more accurate mapping of likely oil migration pathways. Known reservoir trends, subcrop edges, structure, hydrodynamics, the distribution and quality of known oil pools can all be integrated into mapping migration paths. This allows for more accurate mapping of likely oil and gas migration pathways, which can be used for prospect risking and for the ranking of exploration plays.