Organofacies of the Winnipeg Formation of Southern Saskatchewan

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Since the 1960's, hydrocarbons have been detected and produced from sandstones within the Black Island Member of the Middle Ordovician Winnipeg Formation of southern Saskatchewan, North Dakota, and northeast Montana. However, despite some sporadic analyses, the Winnipeg Formation had not been the focus of systematic petrographic and geochemical analysis and little was known about the nature and the source potential of the Winnipeg Formation. The focus of this presentation therefore, is to present and describe the source potential of the Black Island and Icebox members of the Winnipeg Formation within southern Saskatchewan and its implications for exploration.

The Winnipeg Formation of southern Saskatchewan is comprised of two members: the Black Island and Icebox. Rockeval and Leco total organic (TOC) analyses conducted on shale intervals within the Black Island Member of southeastern Saskatchewan exhibit a wide range of source potential, from poor to good. Petrographic analysis reveals that the organic matter within the Black Island Member is composed of unicellular Prasinophyte alginite with a subordinate amount of amorphous organic matter (AOM). The source potential and thermal maturity of the shale intervals within the Black Island Member appears to increase towards the extreme southeastern corner of Saskatchewan.

Rockeval and TOC analysis of shales within the Icebox Member also indicates a wide range in generative potential, from poor to excellent. Petrographic analysis identified the presence of *G. prisca* and unicellular Prasinophyte alginite, various acanthomorphic acritarchs, and AOM. Generally, the source potential of the Icebox Member increases northward and thermal maturity increase southwards towards the Canada/U.S. border.

The concept of organofacies is invoked to describe and interpret the spatial and temporal occurrence of organic matter within the Icebox Member and recognise differing degrees of source potential. Three distinct and mappable organofacies exist within the Icebox Member.

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