

The Lower Cretaceous Sparky Sandstone, Redwater Area, Central Alberta: Stratigraphy and Paleoenvironment

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ABSTRACT

The Lower Cretaceous (Albian) Mannville Group is extensively drilled for hydrocarbons containing $1\ 504\ 655 \times 10^6 \text{ m}^3$ of discovered gas-in-place (Warters *et al.*, 1997). The Mannville Group is of economic importance to the petroleum industry containing 23.6 per cent of the total gas resources in the Western Canada Sedimentary Basin, and is estimated to contain an additional $957\ 491 \times 10^6 \text{ m}^3$ gas-in-place (Warters *et al.*, 1997). In Alberta, the Mannville Group contains numerous highly productive sandstone reservoirs, such as the Falher Members in the west, the Colony-Lloydminster series in the east, the Grande Rapids Formation in the northeast, and the Glauconite Sandstone to the south. These aforementioned prolific producers have been studied in great detail by many authors, but none of these have focussed on sandbodies outside of these high production areas.

This study investigates Sparky-equivalent sandstones in central Alberta approximately 100km north-northeast of Edmonton, enclosing Twps. 59-61, Rges. 20-22W4M. The Sparky Sandstone is largely non-marine in the southeast (Twp. 59) and Sparky shorefaces prograded northwestwardly, joined by marine shales in Township 60, and further northwest. The study area was chosen to span this non-marine to marine transition. Over 300 well log signatures and 2 available cores were studied in detail to determine the stratigraphy and interpret the principal environments of deposition of the Sparky-equivalent sandstone.

The study interval has a thickness of up to 40m defined stratigraphically by multiple coal horizons that correlate through most of the study area. The Sparky Formation is divided into the Upper and Lower Sparky. The Lower Sparky is recognized as regional coarsening upward sandstone and shale cycles. The average thickness of the lower unit varies from 11m in the SE to the 20m toward the NW where a second sequence of sandstone deposition is introduced. The Upper Sparky is recognized as localized blocky to fining upward sandstone sequences with rare 3-5m coarsening upward sequences topping the succession. The average thickness of the upper unit is 10-15m, to a maximum thickness of approximately 17m. This localized sandstone has a gross southeast-northwest trend. Deposition of the Sparky Sandstone represents a barrier bar environment controlled by a low gradient, slowly subsiding shelf and the rate of sediment supply.