The Sedimentology and Ichnology of the Falher D Member, Deep Basin, West-Central Alberta: Effects of Bioturbation in Low Permeable Gas Prone Reservoirs

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Abstract

Presently most hydrocarbon production from the Lower Cretaceous Falher Member in the western Canadian Deep Basin resides within well-sorted conglomeratic shoreface reservoirs. However, a vast volume of gas is trapped within low-permeability (0.1mD) sandstone reservoirs, which is largely unexplored. Recent research has shown that in low-permeability gas-charged sandstones bioturbation can dramatically affect (increase or decrease) porosity and permeability distribution in sedimentary media. This is important because even slight increases in the sandstone permeability would have important implications pertaining to reserve estimation and deliverability.

The Falher Member within the Elmworth/Wapiti field area consists of stacked successions of coarsening-upward storm-dominated sandstones and conglomerates. One such succession, the Falher D, consists of "tight" very fine- to very coarse -grained shoreface deposits overlain by well-sorted conglomeratic shoreface reservoirs. Therein, permeability facies are difficult to assign. Pore throat diameter, though partly linked to grain size, is predictably small in many Deep Basin rocks. Bioturbation is sporadically distributed and its influence on permeability is not immediately evident. Thin-section, minipermeametry, and porosimeter analyses indicate that variable cementation does occur within bioturbated facies, which could lead to local, subtle and patchy permeability variations. However, we feel that the statistical assessment of these variations is handicapped by the lack of precision of permeability measuring techniques. This is being addressed with ongoing research.