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Reservoir Characterization of a Basal Quartz Fluvial Incised Valley in South Central Alberta, Canada

This paper describes the detailed reservoir architecture and sedimentology/ichnology of an Early Cretaceous (Mannville Group; Basal Quartz Fm) fluvial, incised-valley fill in the Western Canada Sedimentary Basin. The gas reservoir is approximately 1990 km² (OGIP 450Bcf), and is located immediately west of the city of Calgary. Over 600 well logs and 60 core have been interpreted and tied to 3D seismic permitting comprehensive mapping of a trunk valley system. The incised valley system cuts unconformably into underlying Mississippian-aged strata and is filled by early Aptian-aged 'BAT unit' stacked, quartz and chert sandstone fluvial channel deposits that grade upwards into interbedded floodplain/paleosol deposits. These organic-rich siltstone to mudstone facies are bioturbated by adhesive meniscate burrows (AMB) likely formed by insects. Meniscate burrows are interpreted to be a part of the nonmarine *Scoyenia*, ichnofacies. Palynology samples from core in the study area are typical of semi-arid to arid environments subject to flooding/drying out cycles, providing additional support for a fluvial interpretation.

The high-accommodation style reservoir architecture is subdivided into successive 'parasequences'. Changes in stacking patterns are interpreted to be tectonically driven, as this valley system was filled in a foredeep position, proximal to the rising Rocky Mountains. Pseudo-flooding surfaces are interpreted to correlate with the extensive floodplain facies, as tectonically quiescent periods resulted in lower gradients and less coarse sediment load. These mappable surfaces onlap valley edges and organize the valley-fill into five stacked-channel reservoir units. Channels within individual parasequences thin upwards, and successive parasequence 'packages' thin towards the capping sequence boundary.