A Sequence Stratigraphic Approach to Interpreting the Depositional Setting and History of the Souris Valley/Lodgepole Succession in Southeastern and South-Central Saskatchewan

Don Kent[1]

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Abstract

The Mississippian Souris Valley/Lodgepole succession in southeastern and south-central Saskatchewan is grossly under-explored and poorly understood. Its relationship to the hydrocarbon producing Lodgepole strata in Manitoba has been given little consideration. In addition, most of the available cores from the Souris Valley are from subcropping rocks that yield oil near the top of the unit. Since the discovery of oil in the Ordovician rocks of southeastern Saskatchewan, well penetrations of the Mississippian Souris Valley Beds have increased significantly making it possible to determine from geophysical well logs the gross lithological composition of that unit. Examination of sparsely distributed cores from various stratigraphic levels in the Souris Valley combined with well cuttings has aided the well-log lithological interpretations. Employing a sequence stratigraphic approach, a reinterpretation of the depositional setting of the Souris Valley has been established.

Gamma-ray logs suggest that, over a large portion of southeastern and south-central Saskatchewan, the Souris Valley Beds include alternations of argillaceous and non-argillaceous carbonates. However, in a small area of southeastern Saskatchewan, the gamma-ray logs indicate that up to 150m of the Souris Valley succession is non-argillaceous carbonate. Well-to-well correlation of the alternating argillaceous and non-argillaceous intervals demonstrates that they may be clinoformal strata draped on the margins of the thick non-argillaceous rocks. Skeletal debris flows within the clinoforms and Waulsortian-type mounds that might have been established at the base of the slope down which the debris moved may be potential hydrocarbon exploration targets.

Keywords: Saskatchewan , sequence stratigraphy, Souris Valley Beds, Lodgepole Formation.

[1] D.M. Kent Consulting Geologist Ltd., 86 Metcalfe Road, Regina SK S4V 0H8; E-mail: kentdo@uregina.ca