

Depositional Analogues and Sequence Stratigraphy for Late Triassic Fluvial Reservoir-Prone Successions of the Rankin Trend, Northwest Shelf, Australia

Lang, Simon C.¹, R.J. Seggie¹, Neil Marshall¹, David Alsop¹, Chris Cubitt¹, Robert Kirk² (1) Woodside Energy Ltd, Perth, Australia (2) Rob Kirk Consulting

The Late Triassic of the Goodwyn-North Rankin trend on the NW Shelf, Western Australia, consists of a thick non-marine to marginal marine succession. The region contains several large gas fields hosted mainly within the Mungaroo Formation and overlying Brigadier Formation, forming a large scale back-stepping succession (2nd order transgressive sequence set).

The Mungaroo succession comprises numerous stacked fining-upward successions bounded by 3rd order and 4th order sequence boundaries, typically beginning with multistorey high net-gross, mainly coarse-grained, cross-bedded, bedload-dominated, fluvial channel sandstones. These lie within discrete incised valley fairways based on seismic amplitude horizon slices using 3-D seismic. These are overlain by more isolated fluvial channel sandstones (low-sinuosity avulsion belts) and associated crevasse splays, encased within grey to variegated, fine-grained floodplain sediments. Several key fine-grained intervals include carbonaceous paleosols (gleysols) grading to coal, overlain by laminated lacustrine shales that occur throughout the succession marking maximum accommodation intervals that facilitate correlation between wells. In some places more mature variegated and reddened paleosols highlight sequence boundaries developed on interfluves, and are interpreted to correlate laterally to sandstone filled incised valleys.

Analogues used to assist understanding of reservoir geometry and likely connectivity include the fluvial systems of the Gulf of Carpentaria, northern Australia. This region contains low sinuosity sandy rivers that lie within discrete incised valleys and multilateral channel-belts, associated with broad crevasse-splay/channel margin facies that grade into floodplain with increasing paleosol development away from the channel belt. The lower alluvial plain grades into coastal plain where higher sinuosity channels, swamps and shallow lakes predominate.