

A Review of the Application of Sedimentology, High-Resolution Sequence Stratigraphy and the Use of Modern and Ancient Analogues to Improve Reservoir Models in the Cooper Basin, Australia

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In 1999 Santos Ltd initiated a reservoir study of the Permian age fluvial deposits in the Baryulah area of the Cooper Basin, Southwest Queensland, to assist in the future planning of development and appraisal of the area. This study utilised the application of high-resolution sequence stratigraphy and 3-D seismic to build geological reservoir models, a common work practice within the petroleum industry; in addition, reservoir analogues from highly constrained datasets within similar geological settings were used to reduce reservoir uncertainty away from well control.

Detailed facies maps were constructed for 11 Permian chronostratigraphic intervals using data from the existing nine wells, suitable reservoir analogues and 3-D seismic amplitude maps imaging high sinuosity features interpreted to be meandering channel forms.

The study recommended focusing future development and appraisal effort on two prospective facies types. Of particular interest were the lowstand intervals within the Patchawarra and Toolachee Formations, interpreted to provide excellent reservoir connectivity; additionally the transgressive/highstand intervals of the upper Patchawarra Formation were identified as potential stratigraphic targets.

Since the study concluded, a further 24 wells have been drilled within the area providing a good opportunity to review actual results against the study conclusions - the most productive intervals within the area to date have been the lowstand deposits of the mid Patchawarra Formation with much of the recent development activity focussing on these reservoirs. The study also correctly identified the potential for stratigraphic trapping within the area; with development and appraisal drilling confirming the presence of a large stratigraphic reservoir unit within the Toolachee Formation.