

Petrographic and Mineralogic Evaluation of Shale Core Samples from the Roseneath and Murteree Formations in the Cooper Basin Australia

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Abstract

Unconventional shale plays have received marked attention over the last 5 years because they present an enormous economic potential and yet they are amongst the least understood of all the sedimentary rock types. The Cooper Basin is one of the largest Gondwana intracratonic basins in Australia extending from northern South Australia into southwestern Queensland covering approximately 130,000 km². The basin is highly prospective for shale gas particularly within the Permian lacustrine shales of the Murteree and Roseneath Formations.

This study presents some basic rock characteristics that are important for the reservoir evaluation. Core samples from the Dirkala-02 and Moomba-46 wells were used for petrographic analysis for which 54 thin sections representing massive siltstone, organic shale, silty shale, siliceous claystone, and calcareous claystone lithofacies were selected. Detrital composition, texture, secondary cements, porosity characteristics and diagenesis were analysed. The Roseneath Formation is a dark grey to black, organic-rich, carbonaceous, micromicaeous shale while the Murteree Formation is a medium to dark grey, occasionally light grey, organic-rich siltstone to shale with minor carbonaceous flecks. Both shales are high in organic content.

Petrographic evaluation of shale core samples aids in the identification of source, reservoir, and lithofacies characteristics, which is critical for understanding natural gas potential. Lithofacies stacking patterns within the Roseneath and Murteree formations are extensive throughout the basin, and the results of this study will aid in evaluation of shale gas potential throughout the basin, and elsewhere, further improving exploration and shale gas opportunities in the Cooper Basin.