Palaeogeography of the Roseneath Shale in the south-western Cooper Basin, South Australia

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ABSTRACT

The Cooper Basin comprises the Early Permian non-marine sediments of the Gidgealpa Group including the Roseneath Shale which is the major focus of the study. Lithologically, the Roseneath Shale has been identified as the thick lacustrine shale unit which was deposited in a large freshwater lake (the 'Lake Roseneath') extending across the basin. Previous studies were more focussed in the major troughs where the thickest units were observed such as the Nappamerri Trough. This study is concentrated on the Patchawarra Trough towards the southwestern of the basin to understand the possibility of facies variations in the study area.

The combination of wireline log analysis, sequence stratigraphy and palynology permitted the study to create a new chronostratigraphic framework for the Roseneath Shale. To achieve this, palynological data was used to confine the APP41 interval of the Roseneath Shale in the regional wireline correlation. A flooding surface was interpreted within the unit leading to identification of two distinct time-equivalent units; APP41a and APP41b units. The interpreted wireline cross section data was utilised for the construction of isopach maps and lithofacies maps. The isopach maps were used to understand the sediment distribution and to recognise thickness trends whereas the lithofacies maps were used to predict the source of the sediment supply and the regional facies variations. Core data of Moomba 065 was studied to understand the Epsilon-Roseneath transition. Derived from all the analysed data, palaeogeograhic maps for the two subunits were reconstructed.

Based on the wireline log analysis, five depositional environments were recognised in the study area and these include lacustrine, prodelta, distributary mouth bar, distributary channel and coal swamp deposits. The APP41a interval represents a delta progradation from the north/northeast into the Lake Roseneath owing to an increase in sediment supply. The APP41b interval marks the increase in lake level and transgression of the lake toward the north. Regional subsidence and differential subsidence are the possible controls on the stratigraphic framework of the Roseneath Shale.

Sedimentation of thin Roseneath Unit on the ridges along the Gidgealpa-Merrimelia-Innamincka Trend was proposed based on thickness trend shown in the isopach maps as well as the presence of preserved unit in some wells along this trend.

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