

Chronostratigraphy of the Late Permian Dongara Sandstone, Northern Perth Basin

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Recent oil and gas discoveries in Late Permian reservoirs of the Northern Perth Basin (Cliff Head, Jingemia, Hovea, Eremia, Tarantula, Evandra and Centella fields) have highlighted the need for improved understanding of its depositional history. Existing published geological interpretations are lithostratigraphic-dominated and do not adequately address the spatial and temporal facies complexity of the onshore Late Permian.

A new high-resolution chronostratigraphic study has subdivided the Late Permian units into four retrogradational parasequences (Palynological Zones: *D.ericanus* *D.parvithola*) with coeval fluvial, deltaic, upper shoreface, lower shoreface, and carbonate facies. Sediments were deposited during a relative marine transgression and represent a conformable transition from a Late Carboniferous glacial lacustrine setting (Carynginian Formation) to a Late Permian marine setting (Kockatea Shale). Siliciclastic sediment provenance is interpreted to be predominantly from the north.

Best quality reservoirs are associated with the upper shoreface sands (Dongara Sandstone). This prospective hydrocarbon-prone facies is mapped as a series of discrete backstepping packages and not, as previously thought, a single regional coastal marine deposit. Reservoir quality reduces dramatically in the adjacent lower shoreface facies (Wagina Sandstone), as evident from recent appraisal drilling in the Jingemia oil field.

The sequence stratigraphic interpretation used biostratigraphic, wireline and core data from forty-two onshore and offshore wells. Handheld spectral gamma was recorded over the core to assist with facies recognition and correlation. Anomalously high thorium readings in association with a ratty gamma log motif were interpreted as a beach or ravinement surface. Poor seismic resolution prevented a detailed seismic stratigraphic interpretation, but isopach maps were used to define the regional palaeogeographical setting.